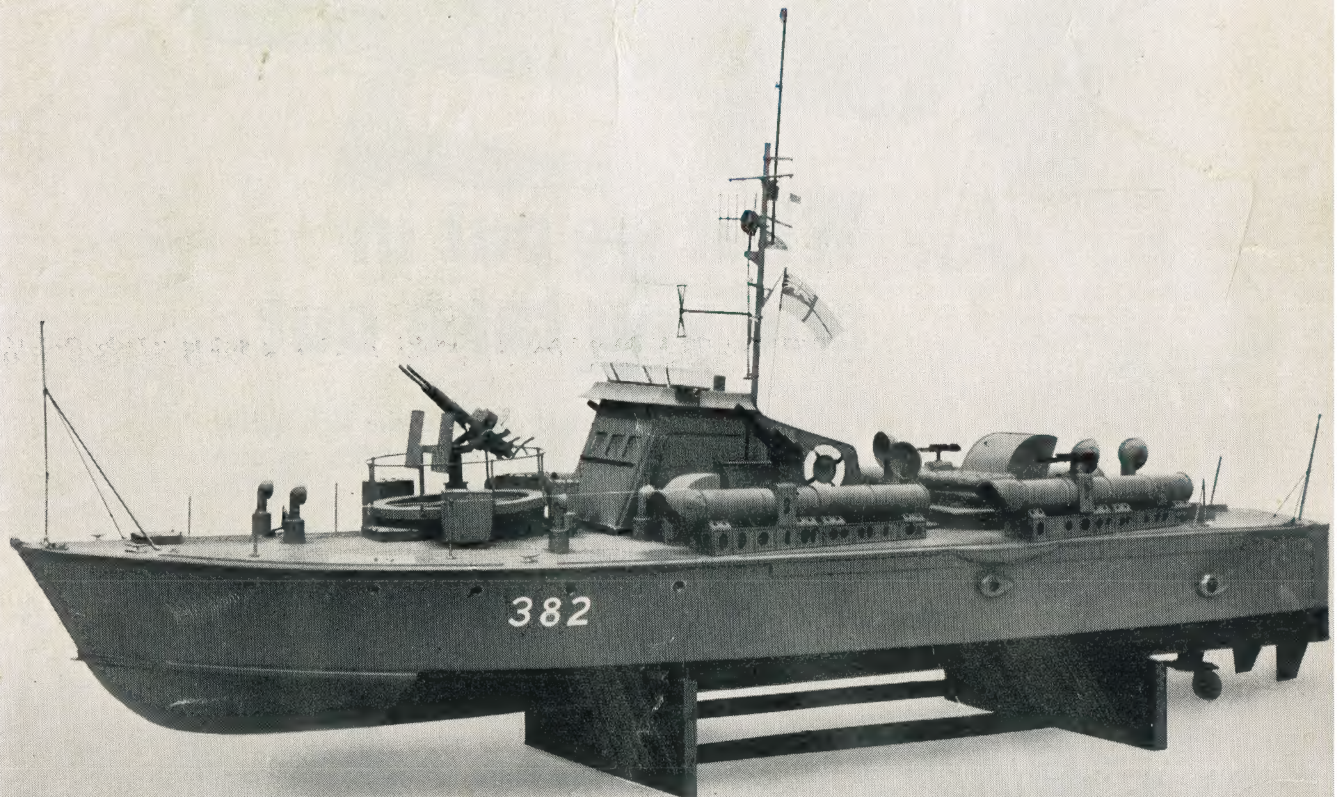
THE MODEL ENGINEER



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JULY 1st 1954
Vol. 111 No. 2771
9D

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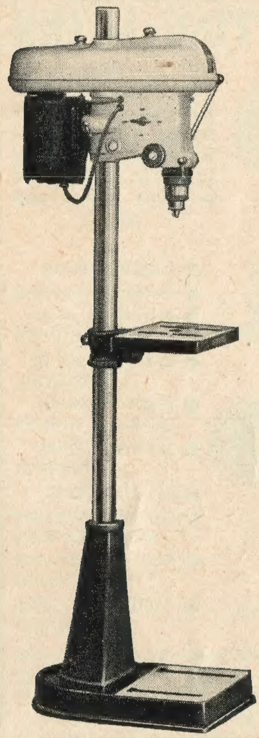

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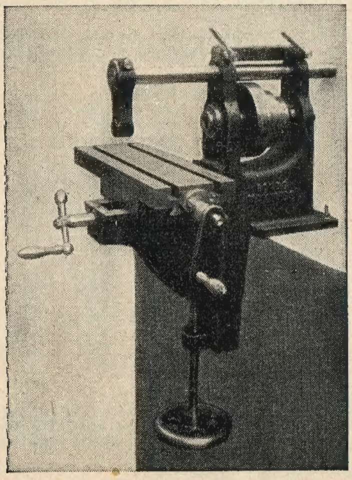

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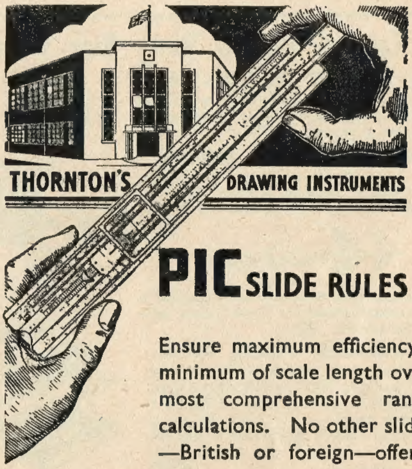

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THE MODEL ENGINEER

EVERY THURSDAY

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Our Cover Picture

The subject this week is a very fine model of a Vosper M.T.B. which was shown at last year's "M.E." Exhibition, where it was awarded a Bronze Medal. The model also won the "M.S. & P.B." Prize, now the "S. & S.M." Prize, of 5 guineas which is awarded annually to the best ship model in the Exhibition made to Percival Marshall designs. The design from which this model was made was prepared by W. J. Hughes, of Sheffield, well known for his articles on "Talking about Steam," which have been appearing in THE MODEL ENGINEER for some time past. The model is made to the scale of ½ in. to 1 ft., and is 36¼ in. long by 9¾ in. beam. It was built by Mr. V. R. Treeby, of Hornchurch, Essex, who is to be congratulated on a very successful effort.

SMOKE RINGS

"Microscopic" Progress !

AT A recent meeting of a well-known model engineering club, an excellent example of the research microscope designed and described in THE MODEL ENGINEER, by Mr. Laurence H. Sparey, was produced for inspection. Everyone agreed that it was a splendid piece of work, which reflected great credit on the constructor. But one member, cogitating on the reasons why this particular piece of apparatus should have been undertaken by a member whose principal interest is in model locomotives, suggested that perhaps he had built it in order to find the bits and pieces of the *Hielan' Lassie* he started some years ago !

Thoughts from a Seaman

MR. R. ABBOTT, who is an engineer on a 28,000-ton super-tanker owned by a large oil company, has sent us a most interesting letter which, however, is far too long to publish in its entirety. But he is an assiduous reader of THE MODEL ENGINEER which he says he has found most useful in his work, and he recommends it to his juniors; he adds that these young fellows are usually sadly deficient in workshop practice, nowadays. His ship has a 13,500 h.p. geared turbine powered by three water-tube boilers working at 500 p.s.i. The ship is dry-docked once a year, and between dockings the turbine needs no maintenance. At sea, one boiler is shut off for cleaning every three months. This is a very different thing from the constant vigilance and maintenance formerly given to the big diesel engines which the steam turbine has replaced.

Mr. Abbott has built two *Mollyettes* on the ship's well-worn 10 in. centre lathe. Then he built himself a 2¼ in. by 8 in. b.g.s.c. lathe out of all manner of odds and ends; as he has to travel a lot when joining or leaving ships, the lathe had to be light in weight ! It is sturdy and does its job, for he used it to build a simple oscillating engine and boiler for a model steamship, as well as a *de luxe* edition of "L.B.S.C.'s" "6-year-old's 4F" which astonished him by its performance about which he had formerly been sceptical.

Mr. Abbott wonders if one of our American readers could give details of the machinery for the New York river steamer *Robert Fulton*, as he would like to make a model of her with correct engines; it would certainly make a most fascinating model.

The "Bristolian"

ONE OF the fastest pre-war trains in Britain, the "Bristolian," has been restored to its pre-eminent position by being booked to cover the 118¼ miles between Paddington and Bristol in 105 minutes, each way. The down train leaves Paddington at 8.45 a.m. and arrives at Bristol at 10.30 a.m.; the return trip leaves Bristol at 4.30 p.m. and is due at Paddington at 6.15 p.m.

On June 14th, we saw the train which inaugurated the restored times. Headed by engine No. 6000, *King George V*, and made up of seven coaches—engine and coaches in immaculate condition—it passed Taplow, 22½ miles from Paddington, at 9.5 a.m. precisely, and was going at well over 80 m.p.h. Bristol was reached in 100 minutes.

The same engine and train, on the return trip, passed Maidenhead 1¼ minutes late, but arrived at Paddington 4 minutes before time, having run the 118¼ miles from Bristol in 101 minutes. The last 24 miles were run in 18½ minutes.

A Change of Address

THE NATIONAL Traction Engine and Tractor Association (Inc.), formerly of Duke Street Chambers, Reading, Berks, announces that it has moved to a new office at 52, Bedford Row, London, W.C.1. The Telephone number is Chancery 4504, and the Telegraphic address is "Threshaul Westcent London."

The last "Free" Railway

An horse-drawn passenger coach on the Oystermouth Railway, about 1865

ON June 29th, the celebrations of the 150th anniversary of the Swansea and Mumbles Light Railway were in full swing along the pleasant, hill-girt arc of Swansea Bay.

Such celebration is indeed fitting, for this little system, which has been in the news more than once, in its somewhat stormy career, is the oldest surviving public railway left in private ownership. Moreover, it is probably not too much to say that it was the first public passenger railway in the world, and certainly saw passenger service twenty years before the classic Stockton and Darlington.

Many Forms of Traction

True, it is in effect, a superior kind of tramway system today, but many a " puffer "—goods and passenger—has traversed its metals in the past, and it has the remarkable distinction of having enjoyed seven different forms of traction in its time, these being by horse, sail(!), steam power, battery electricity, petrol locomotive, diesel locomotive, and overhead electric traction.

Construction of a " railroad or tramroad " to link Swansea with Mumbles seems to have begun in the autumn of 1804, following the passage of a Bill through Parliament. The intention was that this railroad should be for industrial purposes, i.e., for the carriage of iron ore and limestone from the cliffs, but passenger traffic began on March 25th, 1807, the earliest known record of public passenger transport by rail.

The vehicle was provided by Benjamin French, who contracted to pay the company £20 in lieu of tolls, for permission to operate. In 1809 a contemporary novelist, Miss Elizabeth Spence, wrote: " I never spent an afternoon with more delight than the former one in exploring the romantic scenery of Oystermouth. I was conveyed there in a carriage of singular construction, built for the convenience of parties, who go hence to Oystermouth to spend the day. This car contains twelve persons and is constructed chiefly of iron; its four wheels run on an iron railway by the aid of one horse, and is an easy and light vehicle. . . ."

There were, however, notable exceptions to this method of traction, as has been implied. Thus, the paper " Cambrian " reported on April 18th 1807, an attempt to drive a vehicle on this track, by wind power. It appears that some sailors rigged a rail wagon with some kind of lugsail, and covered 4½ miles in under three-quarters of an hour, but history does not record the condition and state of mind of these jolly jack tars at the time. . . . One can imagine it may have been quite a serious affair, of course, with minor naval technicians, off duty, taking an intelligent interest in the progress of land traction. But one can equally well imagine that a few carefree and possibly pot-valiant fellows were bent on getting an original form of hitch-hike.

New Lease of Life

The railway proved fairly profitable, and horsed traction for goods and passengers was at this period being regularly employed. In 1826, however, a road was made between Swansea and Oystermouth, and subsequently the rail passenger service was discontinued in favour of a horse-bus service. During the 30 years that followed, the railway became almost derelict and was the subject of much financial chicanery, but in 1855, edge rails and wooden sleepers took the place of the former angle plates, granite blocks and dog-spikes (for unflanged vehicles) and in 1860 a horsedrawn passenger service was once more instituted. It is interesting to note that at this period the railway seems to have been valued at about £25,000 and was about five miles long. Each train comprised one or more carriages with one or two horses to each, and took 43 min. for the journey. There was a service of seven trains each way daily, and as many as 5,000 passengers had been carried in a day.

By virtue of an Act of 1874, the Swansea Improvements and Tramways Co. (formed to acquire the railways eventually, as well as to operate Swansea street tramways) began to operate the railway on a lease, in the year 1877, and introduced steam traction on August 17th of that year. There was, at this time, considerable opposition to steam traction, particularly in streets, where it might be supposed to cause danger and inconvenience, and, by the Tramways Act, 1870, mechanical traction was generally forbidden. There were exceptions, however, and this Swansea system was one of them, and this was an excellent opportunity for Henry Hughes of Loughborough to introduce his historic tramway-type enclosed locomotive.

Going Over to Steam

The Hughes locomotive *Pioneer* was attached to two new tramcars containing over 80 passengers, and the train ran at the specified speed of 8 m.p.h.; regular steam traction thus began.

Then strange things began to happen. By virtue of much earlier litigation, a private buyer was able

to acquire the railway in the same year, and continued to operate it with more conventional locomotives. The S.I. & T. still had powers to work over the track, in view of its lease, but *not* with steam, and the curious position arose whereby horsed cars followed steam trams over the same metals! This sounds like a somewhat unhappy arrangement for the horses, but it was a statutory requirement that the railway company should keep the space between the tracks in a suitable condition.

A further change took place in 1844 when Sir John Jones Jenkins and Mr. Robert Capper obtained a lease of the Railway and invited the S.I. & T. to work the line with steam power for six and a half years from July 1st, 1855.

Even after this, there was another period of legal wrangling, during which the horsed and steam transport ran on the same tracks, but eventually, in 1899, the S.I. & T. obtained a lease for 999 years, thus becoming owners to all intents and purposes, although the Swansea and Mumbles Railway Ltd., and Mumbles Railway & Pier Co. (which built an extension of the line to a new pier) still exist as freeholders.

Meanwhile the S.I. & T. had passed into the control of the British Electric Traction Co. Ltd., and inaugurated electric traction on its street tramways on June 30th, 1900. It was not until 30 years later, however, that the railway was electrified, and in the meantime the South Wales and Mumbles lease was transferred to the South Wales Transport Co. Ltd. (an associate of S.I. & T.) to provide a closer link between the electrified line and the local bus services.

Interesting accounts of the period relate that in July 1904, King Edward VII and Queen Alexandra came by yacht to Swansea Bay, and cut the first sod of the King's Dock site. They travelled to the dockside in a special coach on the railway. Another Royal visit was in 1920, when King George V and Queen Mary opened the Queen's Dock.

In March 1929, the last steam train ran over the tracks, and electrified services began. They proved so successful that they are still in vigorous operation today. Thirteen double-decker cars are in use, each of which seats 106 passengers. They are the largest electric tramcars built for service in this country. Built by Brush Electrical, they were powered and supplied by British-Thomson-Houston. A train normally consists of one or two of the 30-ton coaches.

Statistics of Today

At present a quarter of a million train miles per annum are operated, and over three million passengers are carried. Traffic is almost entirely passenger, and 40,000 have been carried on a busy day. Sometimes during the steam traction days, 18 or 20 loaded cars were included in one tram, conveying as many as 1,800 passengers—and this without double heading.

In order to compress this brief history into the available space, it has been necessary almost to ignore the mechanical aspects, but it will be appreciated that various types of locomotive have been and are used on this railway—although nowadays only for specialised goods traffic and for shunting tramcars.

In 1877, 0-4-0 steam saddle-tank engines with enclosed motion were in use. Later there were side and saddle tank locomotives, of 0-4-0 and 0-6-0 type, and prior to electrification an 0-6-0 Avonside saddle-tank locomotive named *Swansea* had been added. These were all subsequently disposed of, but replaced by an 0-4-0 Hardy petrol locomotive, and a later acquistion was an 0-4-0 Fowler diesel locomotive.

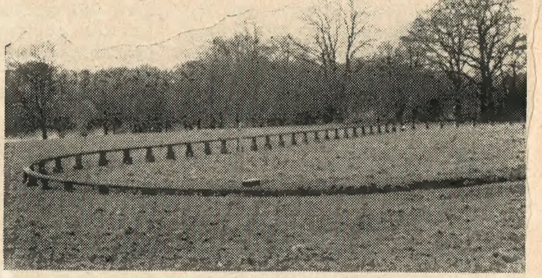
Finally, and as a kind of footnote to this review, it is interesting to consider that the historic records make reference to the expressions "train" and "tramway" from the very earliest days. Readers may care to speculate on the origin of these expressions, but the writer would be surprised if anyone can authenticate their origin!

J. D. McL.

One of the steam-hauled trains of double-deck tramway type cars on the Swansea & Mumbles Railway at the Slip Station, prior to the modernisation and electrification of the line in 1927-29

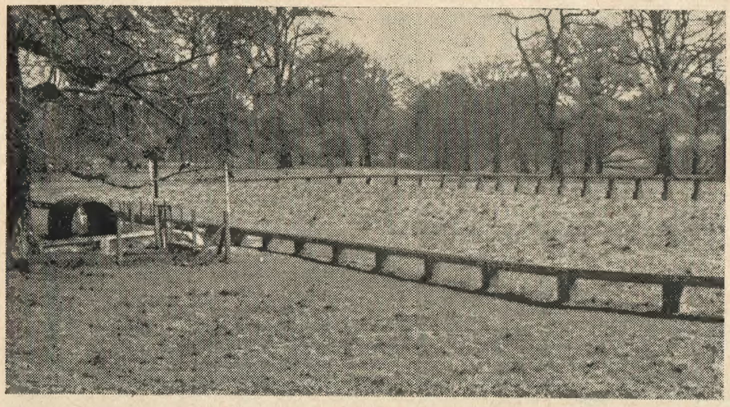
THE MOTE PARK, MAIDSTONE LOCOMOTIVE TRACK

A Communal Project by Members of the Maidstone Model Engineering Society



General view of Mote Park track, showing cutting and one of the two fifty-feet radius curves

ALTHOUGH the society's miniature railway track has now been in very active operation for more than four years, no description of it has yet appeared and it is hoped that the notes which follow will repair that omission.

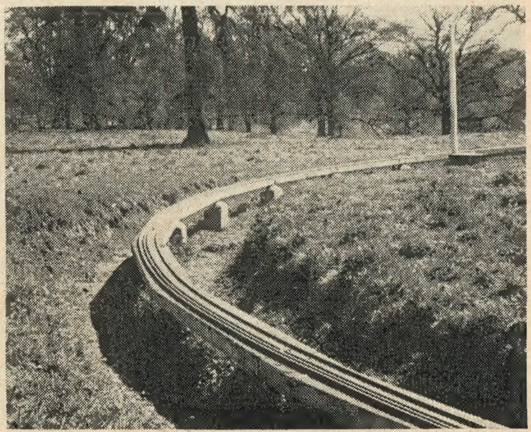


View showing steaming bay, water crane and signal posts

In the autumn of 1948, application was made to the Town Council of Maidstone for permission to build and maintain a track in one of the borough's "public spaces"—Mote Park, Maidstone. The desired permission was obtained with very little difficulty and with surprising rapidity, but it was conditional. The society must not run the track for profit or even make a charge for rides given to members of the public, except with the written consent of the Corporation, and even then only on special occasions; otherwise a rental would be charged for the ground. Another condition was that the whole of the cost of building and maintaining the track must be borne by the society, as well as the cost of all necessary insurances.

Despite these somewhat harsh "strings" to the offer of a plot of land, it was agreed to go ahead with the project, and work actually started on a Sunday morning in October, 1948, and continued each Sunday morning thereafter for the next eighteen months! Incredible as it may seem, only one Sunday in all that time had to be "written off" because of bad weather!

The completed track, opened by the then Mayor of Maidstone in April, 1950, consists of an oval exactly one furlong in length, thus giving eight laps to the mile. The radius of the curves is fifty feet, making life relatively easy even for the "big boys"; and there is a bank of 1 in 120 in one of the straights, with a corresponding run down on the opposite side, to make quite sure that drivers work for their living at least once every lap. Three gauges are catered for—$2\frac{1}{2}$ in., $3\frac{1}{2}$ in. and 5 in.—and the entire track is laid with "Noral No. 5" standard aluminium alloy rail section, manufactured by The Northern Aluminium Company. As doubts have been expressed in some quarters as to the ability of "alley alloy" to stand up to hard wear and hard weather, it can be stated quite definitely that after being "flogged" by locomotive and truck wheels for four summers, and after suffering



Close-up of curved section of the track, showing the use of "straights" for turning corners

Close-up of track, showing water crane, by the signal post in the left foreground is a 500-gallon brick-lined cylindrical section well, into which rainwater is drained from the track and then pumped by hand to the overhead tank

everything the weather clerk could turn on for four winters, the track shows not the slightest defect anywhere and is as comfortable a road to ride and drive on as ever it was; which is saying a great deal, as the many guest-drivers of the society, representing other clubs in the vicinity, will readily confirm.

The aluminium alloy rail to which reference has been made is of the flat-bottomed variety and it is secured by round-headed wood-screws to creosoted Scots pine sleepers cast into reinforced concrete tee-section beams. The upper face of these beams is 10½ in. wide and each is 7 ft. 10 in. long, the beams being supported at their ends by piers consisting of reinforced concrete plinths on which filled and reinforced pre-cast concrete blocks are built up to the required height. The actual method of construction, which has proved hooligan-proof as well as weatherproof, will be clearly seen from the first four accompanying photographs (taken by P. G. Wallis), one of which shows how, by adopting a curve radius of 50 ft. and a spacing between piers of 7 ft. 10 in. it was found possible to turn the corners of the oval with straight sections, an apparent contradiction in terms which obviated the trouble and additional expense of making moulds for curved beams. There are eighty-three piers in all, and the "lie of the land" was such that a cutting nearly four feet deep had to be made at one end of the oval, with a corresponding elevation above ground level at the other end; this, too, can be seen from the photographs.

On the "down" straight there is a swing-bridge giving access to a steam-raising and maintenance bay which, in turn, runs into a lock-up engine and stores shed. Adjacent to the steaming bay is a water tank, into which rainwater is pumped by hand from an underground well, constructed by the society as a part of the general project and fed with water collected from the surface of the track itself; in four summers, some good and some not so good, there has never been a shortage of water, a fact which is in itself a tribute both to English summers and, more particularly, to the society's member-designer, Mr. E. G. Rix who, incidentally, is himself a MODEL ENGINEER Challenge Cup winner. His free-lance five-inch gauge Pacific, with which the cup was won some years ago, may be seen in one of the photographs, with its builder driving.

At the moment, the society has in hand the provision of a signalling system for the track (two of the posts have already been erected) and one or two other modifications and improvements are also being carried out. Visiting societies or their individual members are always welcome, by previous negotiation to ensure the availability of the date chosen; all requisite information, including directions for finding the track, for those who are strangers to the district, will gladly be given by the chairman, P. G. Wallis, whose address is "Alvis," Spot Lane, Bearsted, near Maidstone.

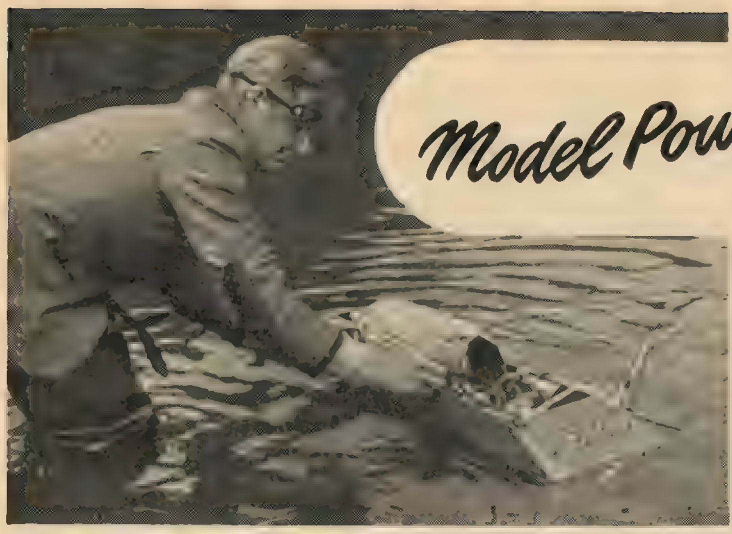
Mr. Wallis has produced a two-reel 16 mm. silent cinematograph film which illustrates the track under construction and in actual use by the Society and other clubs. This film, which runs for nearly half an hour and is partly in colour, is entirely Mr. Wallis' own work and property, and he will be pleased to lend it to any society prepared to be responsible for its safe handling.

Mr. E. G. Rix, driving his "M.E." Challenge Cup winner "Liberty" (a 5-in. gauge free-lance Pacific) on the Maidstone Society's track. Photo by "Kent Messenger," Maidstone

Model Power Boat News

BY MERIDIAN

START OF THE REGATTA SEASON



Heroes both—Mr. Bamford and his turbine-driven flash steamer

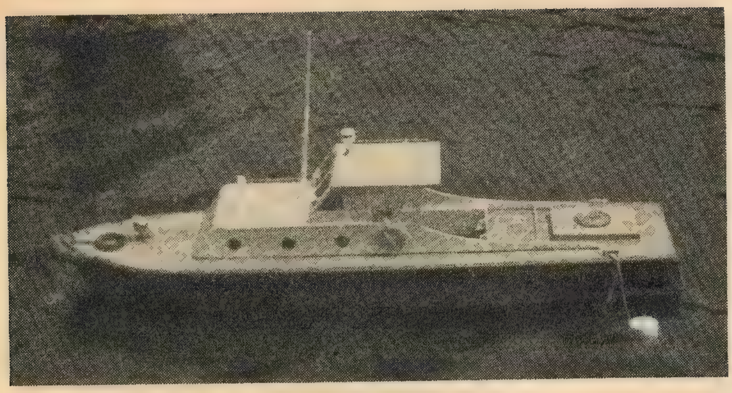
THE first regattas of the 1954 season were held on recent Sundays, and the good attendance proved that enthusiasm for model power boats is as high as ever.

One of these regattas was for radio-controlled boats only, and there appears to be a growing interest in radio-control by power boat exponents. It is apparent, however, that the organisation of a regatta for this type of boat is more difficult than that required for ordinary hydroplane or straight-running events. Due to the fact that each boat must be run separately, it would be quite impossible to cope with large entries such as those that have been entered in some regattas during recent years. Last season, for example, total entries of 60 or more occurred more than once at inter-club regattas. Such entry lists are always a problem to the organisers, but it looks as if the advent of radio-control competitions will provide a new set of headaches for the officials.

The radio-control regatta held by the South London M.E.S.

Mr. W. Brightwell (Wicksteed) starting the o.h.v. engine of his " A " class boat

Two i.c. engine devotees marvel at the complexity of " Ifit 9's " engine room



"*Gisela*" *by Mr. Mapplebeck* (*St. Albans*) *which has had the upper works and radio control gear fitted*

attracted a total of 14 competitors, and the entries included several boats that are new to regattas, and others that are well known, such as the launches of Messrs. Caird and Curwen of the Bromley club.

An interesting entry was that of H. W. Clayton (Harrow) with his boat *Geebaa*, which was exhibited at last year's "M.E." Exhibition, and is equipped with a formidable array of controls.

The regatta was open only to M.P.B.A. members and the clubs represented included, Victoria, Bromley, Mortlake, W. London and Harrow, besides the home club.

The first event was a set course one, points being deducted for errors, and this resulted in a win for R. Curwen (Bromley) 48 points. The runner-up, Mr. Coote (S. London), was only 1 point behind, scoring 47. It should be mentioned that weed in the lake was rather troublesome, and was responsible in several cases for low scores.

In the target steering, the boats had three runs each, and the usual steering flags were used, but the boats had to pass between two buoys before reaching the flags, and this made matters rather tricky.

The winner, Mr. Stevens (Bromley), scored a maximum—15 points, and M. Coote came second with 9 points; third was R. Curwen, with 8 points.

A speed event round the lake proved quite exciting, as several boats were capable of running around 10-12 m.p.h. The most likely boat to win this race was G. O. Caird's *B.O.A.C.*51, but this craft picked up so much weed, during the two circuits of the course, that its usual high speed was reduced considerably. However, the course was completed in 2 min. 15.8 sec., which was good enough for second place. The winner was M. Coote's *Sirius Star* (S. London), which made a fine run to cover the course in 1 min. 58.5 sec.

St. Albans Regatta

This event was the first big regatta of the season, and the entry totalled some 55 craft. There were events for all types of boats, including a radio-control contest. This latter event, however, was somewhat rushed, due to the fact that the regatta was overrunning for time. Only one boat completed the course in the time allotted, and thus automatically became the winner. This was the fine motor-yacht owned by W. Warne (Mortlake).

The speed event was a combined one, all the different classes competing against each other—a sort of *formula libre* event! There were four place prizes, and a prize for the fastest speed in each class not winning one of the main prizes.

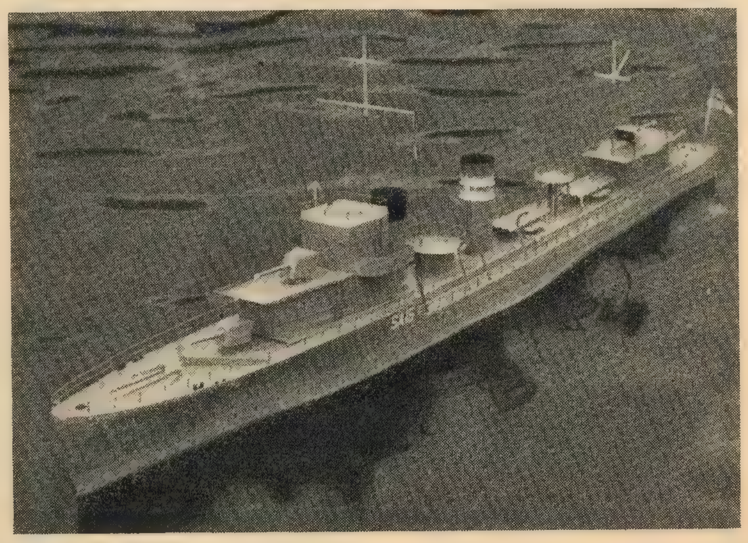
There were some very interesting hydroplanes entered in this race, including several new boats. Among the latter should be mentioned a new Class "A" boat by W. Morris (Bournville), and a flash steam turbine job, also in Class "A," by J. Bamford (Aldershot). This flash-steamer is a most interesting craft—as someone remarked "the boiler-casing is all blowlamp!" The performance attained was about four laps at 40 m.p.h. and this must rank as the fastest speed ever attained by a model turbine job.

Another flash-steamer entered was *Ifit* 9, A. Cockman's smaller boat, now fitted with a stainless-steel boiler, and now running in Class "B." This boat completed five laps quite easily and looks very promising.

From the results, it will be seen that only Class "B" is not placed among the first four, and for some little time this class seems to have lagged behind a little. A brand new boat was entered by G. Lines (Orpington), and the hull is a complete departure from the *Sparky* design, being of the "twin boom" type. The engine is similar in design to the original 15 c.c. engine.

One performance should be specially mentioned, and that is the show put up by J. Innocent's *Betty*. This

(*Continued on page* 9)



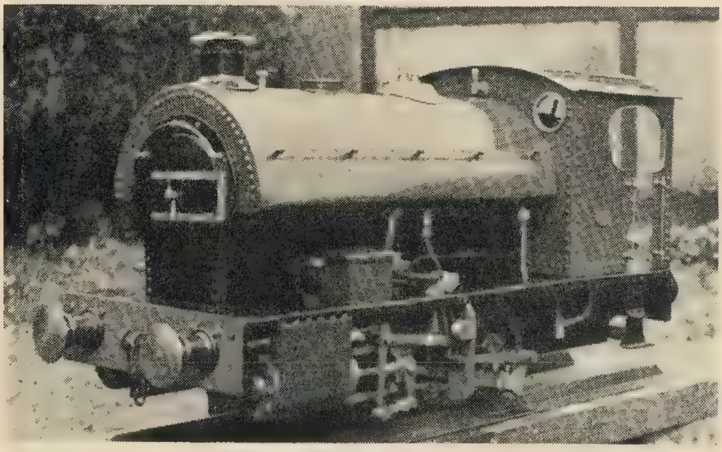
Mr. Lambert's destroyer (*St. Albans*) *still bears evidence of last years' collision with the concrete bank*

A Youngster's Good Work

By S. Ashton

THE following is an account of the work of Mr. A. Green, the youngest member of the Urmston & District Model Engineering Society, who is now only 18½ years of age. The first locomotive to be built by this young man was *Ann of Holland*, a 5-in. gauge saddle-tank designed by Mr. Rogers of Leicester, and was built whilst he was at technical school over a period of two years, being started when he was 13 years of age and finished at about the time he left the technical school at the age of 15. Some modifications were made after tests on the club continuous track, a feed water heater being fitted in the smokebox and the position of the boiler feed pump being altered from behind the front buffer beam to between the wheels, as he felt that the original position of the pump was conducive to the locomotive bounding up and down.

Mr. A. Green, a young member of a model engineering society, busy and happy in his workshop

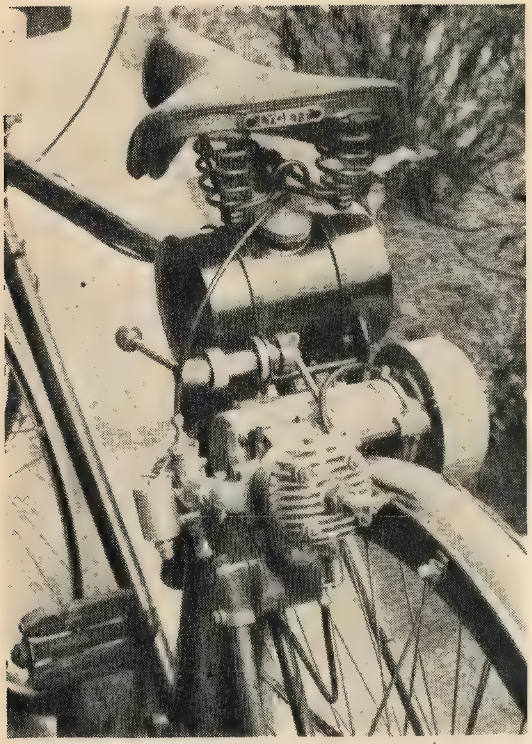


The 5-in. gauge saddle tank locomotive built by Mr. A. Green while at a technical school

After completing this locomotive, he started work on a *Princess Marina* designed by our worthy friend "L.B.S.C." This is a 2-6-0 of L.M.S. design for 3½-in. gauge, and occupied a period of two years to build, as by this time, our young friend had embarked on a career as an engineering apprentice at a large local electrical firm, his spare time being more limited than while he was at technical school. This second locomotive was built to the drawings and includes all the usual trimmings. The injector, after a bit of manipulating, was made to work completely satisfactorily, and is used exclusively while the engine is at work on the club track.

Both these locomotives have won

Right: The 3½-in. gauge 2-6-0 "Princess Marina," built to "L.B.S.C's" instructions



Left: Mr. A. Green's "Busy Bee" petrol engine fitted to a bicycle

awards at the Northern Association of Model Engineers Exhibitions, the *Ann of Holland* taking the first prize in the Junior Section in 1951 and the completed *Princess Marina* chassis taking the first prize in the same section in 1952, the age limit of the Junior Sections at these exhibitions being 17. Both of these locomotives have also done a fair share of passenger-hauling on the club track and have proved themselves very capable and reliable machines.

After completion of these locomotives, Mr. Green turned his thoughts and efforts to something entirely different, namely the "Busy Bee" 50 c.c. 2-stroke engine designed by Mr. Westbury and published recently in THE MODEL ENGINEER; he obtained castings from an advertiser in this journal preferring an aluminium cylinder with manganese-steel liner in preference to one of cast-iron. This engine was built to published drawings, the cylinder bore only requiring lapping, for which an expanding lap was made; the other castings, including the carburettor, were machined as per drawings. The piston rings, sparking-plug and flywheel magneto were purchased finished from local sources. This engine he subsequently fitted to his bicycle, and at the time of writing is still in the "running-in" stage, so an accurate report of its performance cannot be given; but so far a speed of 20 miles per hour has been obtained, and it has also proved a ready and reliable starter.

The whole of the machined work of the two locomotives and the petrol engine was carried out on a $3\frac{1}{2}$-in. Grayson lathe, together with the usual complement of hand tools, files, drills, taps, etc.

Finally, this young man is very keen on his hobby, is also a very enthusiastic club member, is always ready to take his part in club activities, and being a member of the committee, is ready to give a helping hand to anybody in difficulties, and I think that, with him and a few more like him, the safety of the model engineering hobby is very well assured.

START OF THE REGATTA SEASON

(*Continued from page 7*)

boat is 21 years old this year, and she romped round the course at a merry 55.4 m.p.h. !

The top speeds were very good—especially when it is remembered that, for many of the competitors, this was the first race of the season.

The winning speed of 67.9 m.p.h. attained by J. Benson's *Orthon* was the best so far achieved in this country, although over 70 was recorded at last year's Paris regatta.

The straight-running events went off in the usual straightforward fashion, all the boats behaving very reliably. Winner in the Nomination was G. Jones' (Victoria), *Fidelix*, after a tie with J. Chandler's (Southend) new boat *Elizabeth*. Both had nil error and had to re-run.

G. Jones was also concerned in a re-run in the Steering, but this time lost to E. Vanner with *Leda III* who scored a bull in the re-run to ensure first-place.

Results

Nomination Event (80 *yards*)

(1) G. Jones (Victoria), *Fidelis*; Nil error. (1st place after re-run).

(2) J. Chandler (Southend), *Elizabeth*: Nil error.

(3) R. Mapplebeck (St. Albans), *Gisela*: 0.2 sec.

Combined Speed Event

(1) J. Benson (Blackheath), *Orthon*: 67.96 m.p.h. (A).

(2) W. Everitt (Victoria), *Nan*: 63.13 m.p.h. (C.R.).

(3) W. Brightwell (Wicksteed), *W*14: 58.95 m.p.h. (A).

(4) R. Phillips (S. London) *Foz* 2: 58.44 m.p.h. (C).

"A" Prize. N. Hodges (Orpington), *Rita II*: 56.51 m.p.h.

"B" Prize. M. de B. Daly (Blackheath), *Nipper II*: 55.58 m.p.h.

"C" Prize. C. Stanworth (Bournville), *Meteor* 4: 45.05 m.p.h.

"C" Res. Prize. K. Hyder (St. Albans), *Slipper* 4: 54.99 m.p.h.

Radio Control

(1) W. Warne (Morlake).

Steering Competition

(1) E. Vanner (Victoria), *Leda III*: 11 points + 5.

(2) G. Jones (Victoria), *Fidelis*: 11 points + 0.

(3) F. Croll (St. Albans), 7 points.

PETROL ENGINE TOPICS

The 50 c.c. "BUMBLE BEE"

A NEW DEVELOPMENT OF THE "BUSY BEE" AUXILIARY ENGINE INTENDED PRIMARILY FOR STATIONARY WORK

By Edgar T. Westbury

WE come now to a component in which the need for scrupulous accuracy is of paramount importance, more so, perhaps than in any other single item in the construction. This does not imply that it involves formidable difficulties, or that it cannot be tackled with confidence by any reasonably competent and careful machinist; on the other hand, it will come right almost automatically, provided only that the correct methods of machining are employed. But as I know from past experience, there are many constructors who attempt to take short cuts, or to improve on the recommended procedure, and more often than not, land themselves in difficulties, for which the designer is blamed. I should be the last person to claim that my designs, or my methods, could not be improved upon, but I can at least say that they have been considered from all the angles I can think of, and are never committed to print unless and until they have been subjected to practical tests.

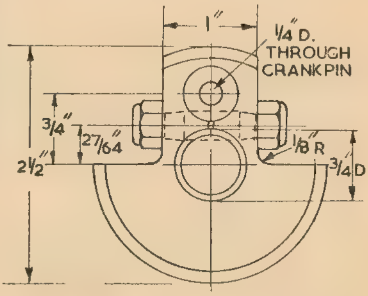
In the introductory article on this engine, I mentioned some of the problems which arise in producing a satisfactory built-up crankshaft of this type, and these comments seem to have been interpreted by several readers as a call for help, to judge by the correspondence it has brought forth. Suggestions galore have been submitted for methods of fabricating crankshafts, including riveting, brazing and welding, also devices for ensuring true alignment of built-up shafts on assembly. I would like to acknowledge the helpful spirit behind these suggestions, and I am never too proud to learn from anyone who has anything to teach; but most of these ideas had already occurred to me, and some have been incorporated in engines which have been described by me in the past, or in the articles dealing specifically with crankshaft construction published a few years ago. In any case, I was already committed to the form of crankshaft shown in the detail drawings herewith, as it had been constructed and found satisfactory.

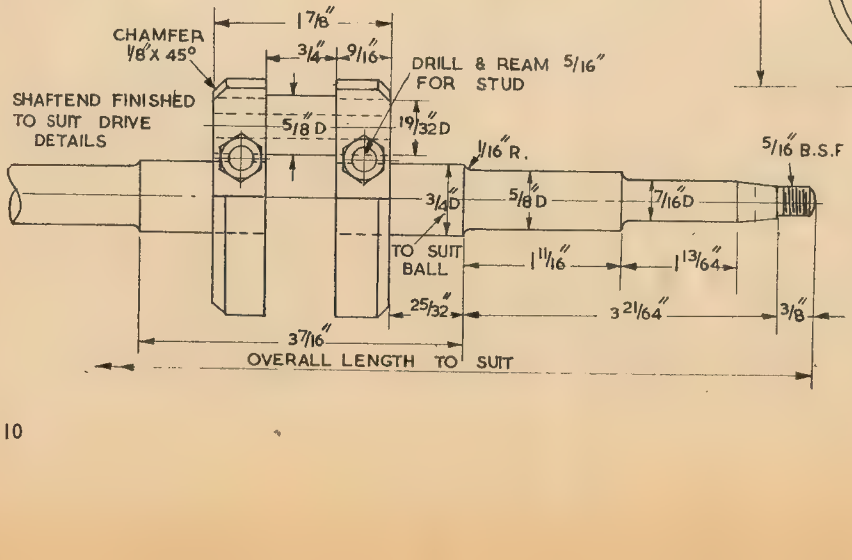
As will be seen, this crankshaft is built up from five separate pieces, all of which can, if desired, be completely detached from each other and reassembled to line up properly, though the need for such drastic dismantling does not normally arise. The journals and crankpin are, of course, turned from bar material, and the webs machined from blanks, which may either be cut from plate of suitable thickness, or sliced from bar of appropriate diameter. In the example illustrated, the blanks were flame-cut by oxy-acetylene blowpipe to approximately the correct shape, plus machining allowance, and Messrs. Braid Bros. are, I understand, making arrangements to supply similar blanks for both this engine and the "Busy Bee," the latter having an overhung crank with a single web of the same contour, but greater thickness, than those used in this case.

Continued from page 686 June 17, Vol. 110, 1954.

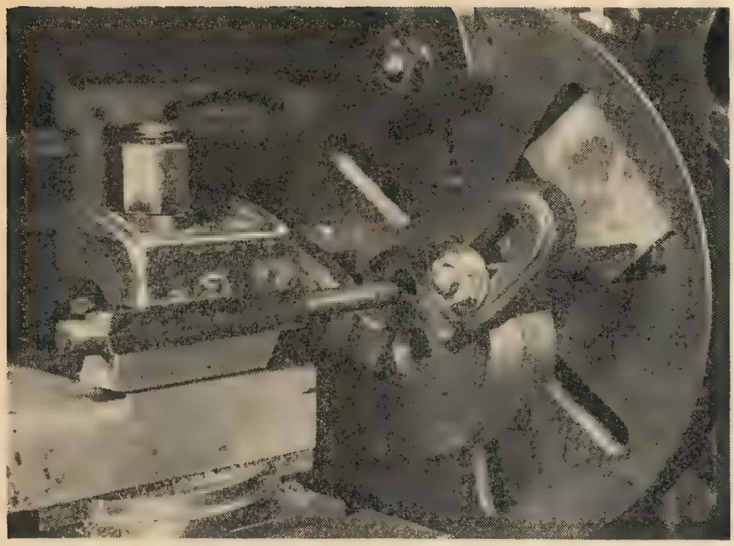
Machining Crank Webs

The first operation on these consists of facing the two sides of the blanks to slightly over finished thickness, and drilling an undersize hole in the centre; the outside diameter can also be roughed down, either by setting each disc on a mandrel, or by chucking them and machining as far as the chuck jaws





Details of detachable built-up crankshaft



Boring the crankpin seatings in the two-web blanks

will all w, then reversing in the chuck and repeating the operation.

It is essential that the rough-machined blanks should be exactly parallel, and this should be carefully checked by means of a micrometer or other accurate means before proceeding further. In the event of error, it may be put right by skimming both sides of the blank at one setting, while mounted on a mandrel, but the need for this can be avoided by careful initial chucking.

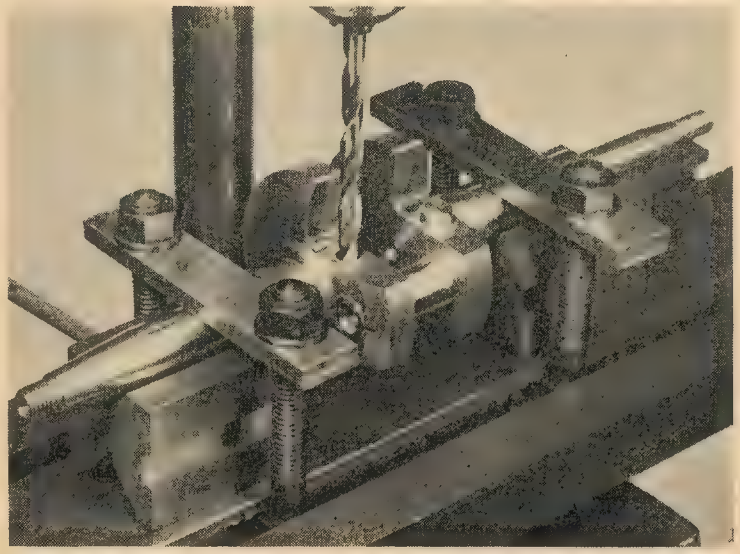
One of the blanks should be marked out to show the crankpin position, having set out the radius as accurately as possible by measurement from the centre; it is advisable to check this by using a point tool in the lathe, to incise a circle, the *diameter* of which can be measured with dividers. Any possible error in setting out the radius will thus be doubled, and correction made if necessary. Slight error in the crankpin radius will not be fatal to success, but may call for minor adjustment of port timing when the engine is assembled.

It is now advisable to fasten the two blanks together for boring the holes for the journals and crankpin, thereby ensuring that there can be no possible error in their alignment. In describing the construction of a somewhat similar crankshaft, but using full discs for the webs, I suggested pinning them together with close-fitting dowels in the part of the web afterwards to be cut away, but in the present example, I sweated the blanks together temporarily. This was done quite simply by smearing one side of each disc with Fryolux " solder paint " (*not* the side which has been carefully marked out for the crankpin !), heating them both up till the solder ran, and wiping off excess flux; then clamping them together under firm pressure and allowing to cool off. To line up the undersize centre holes, an aluminium dowel was used, as this would not adhere to the tinned surfaces, and could thus be knocked out easily prior to finishing the bore.

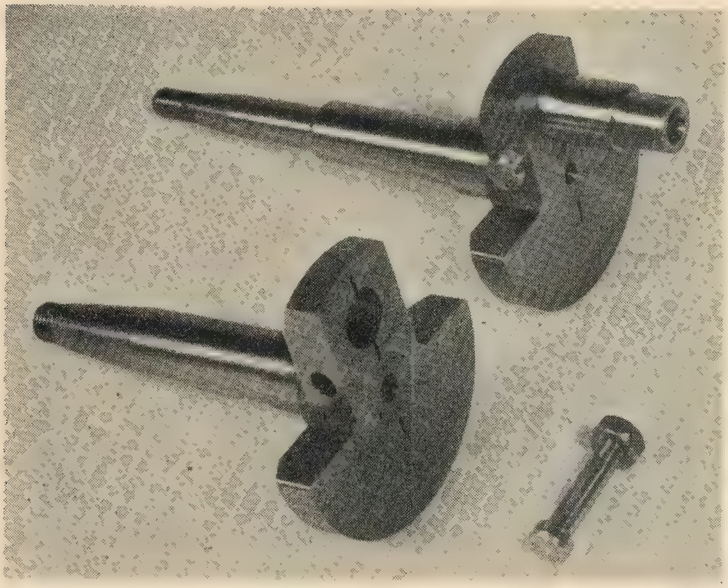
When thoroughly cooled, the two blanks were set up on the faceplate, first of all in the concentric position, and the centre hole bored right through to full size, the last thou. or so being taken out by a reamer. It is most important that the bore of this hole, and also that for the crankpin, should be perfectly smooth and accurate; as much care should be taken over this as in boring a small cylinder. If any roughness remains, the bores should be finished by lapping. Secure fitting of the shafts can only be obtained by proper *surface* contact—not by forcing them over a series of ridges and burrs.

The blanks are now set over to centre the marked-out crankpin position, using any of the approved visual or other methods of ensuring true setting, and the hole is drilled undersize, then opened out with a boring tool, and finished as before. Slight dimensional errors are of less importance than circular and parallel accuracy, as the shafts can be machined to fit. After dismounting the blanks, they can be separated by heating up to the melting point of the solder, and the faces wiped clean, taking care not to get any solder in the holes. The tinned faces will, of course, eventually be the inner faces of the webs in the assembled crankshaft, and this juxtaposition should be carefully preserved when fitting the parts together.

The sawcut between the journal and crankpin bores, on the centre line of the web, may now be made



Crankshaft mounted in aligned vee-blocks for drilling holes for cross bolts



Crankshaft with one side detached (note that a different cross bolt has now been fitted)

either by hand or any other convenient means; an Eclipse "4S" tool is handy for this job. I used a circular slitting saw in the lathe, on a small arbor which allowed maximum depth of penetration in relation to saw diameter, and worked from both sides of the blank. This resulted in the saw cutting into the remote side of each hole to some extent, but this did no harm, as it did not materially reduce the strength of the metal. The blanks were now put on one side pending further operations at a later stage.

Shaft Journals

Many constructors will favour the idea of making the two shaft journals in one continuous piece, with the object of obtaining positive assurance that they are in true alignment, and cutting out the centre piece, between the webs, after assembly. I have, however, pointed out in a previous article that this does not always work out correctly in practice, because forced alignment often results in locking up stresses, which may cause the assembly to spring when the centre is cut out. I leave this detail to the discretion of constructors, but would observe that I favour making the two journals entirely separate, if for no other reason than this affords a check on correctness of the recommended method of machining.

Mild-steel is a suitable material for the shafts, if oil-impregnated bushes are used in conjunction with the ball-races; but if solid bronze bushes are fitted, a harder steel would be very desirable, and Messrs. Braid Bros. are arranging to supply a special alloy-steel for the purpose. Above all, do not use carbon or silver-steel, either "precision-ground" or otherwise, for this job, as any steel designed primarily for tool making is liable to become brittle under the effects of shock and vibration.

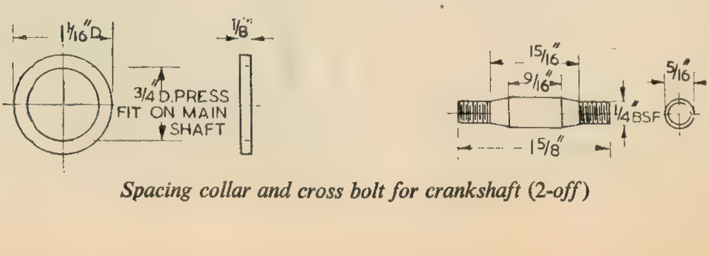
The shafts may be turned between centres, but special care should be taken to see that the live centre runs perfectly truly, and if necessary it should be trued up in position before setting up the shafts for final finishing operation; the back centre should be kept well lubricated so that there is no risk of the shaft centres getting scored or "chewed up." These are small details, but they make all the difference between real accuracy and "near-enoughery" in jobs of this nature. The seatings on the inner end of each journal should be finished to a moderately tight press fit—say, about 1 thou. interference—in the crank webs, and at the flywheel end, the taper should be carefully fitted to match the magneto, using marking colour to ensure that good surface contact is obtained.

No details are shown of the power take-off from the engine shaft, as it may be arranged to suit requirements, whether by belt, chain or direct-coupling; but in any case it is recommended that a pulley for a starting cord, or other form of starting device, should be fitted. In the photograph of the complete engine, in the May 20th issue, the double-grooved pulley shown is intended to take a vee belt in the inner groove and a starting cord in the outer one, the cheek being slotted to anchor the end of the cord.

Before pressing the journals into the crank webs, the spacing rings should be made and fitted; these only serve the purpose of locating the webs at the correct distance from the ball-races to clear the retaining plates, but they should on no account be a loose fit on the shafts or they will creep and cause scoring or grooving. A better idea, where separate journals are employed, would be to make the shafts from larger material and turn the collars integral with them, as this would give a true and positive location for the webs. When the webs are assembled, the shafts may be mounted between centres, for finishing the outer diameter and sides of the webs and chamfering the corners; but before doing so their side truth should be checked, as any side wobble would indicate that "someone had blundered" at some stage of the operations, and the fully assembled crankshaft would inevitably be out of alignment as a result unless something was done about it.

Crankpin

This is made hollow, not only to reduce its weight but also to enable it, if need be, to be mounted on a mandrel for finishing operations all over at one setting. A wear-resisting steel is desirable for this part, but mild-steel will give fairly good results, and may be chrome-deposited on the working surface



Spacing collar and cross bolt for crankshaft (2-off)

or case-hardened if desired. In the latter case, however, it is desirable to take precautions to keep the seatings at the ends soft, and they should be finished to size *after* the hardening operation. One end of the shaft should be made a press fit in the web on the flywheel side, but for ease of assembly, the other end should not be quite so tight; a good wringing fit is sufficient.

The shaft may now be completely assembled, and mounted between centres for checking the alignment; the use of a "clock" (dial test indicator, to be technically accurate!) is desirable for this operation. I may say that no difficulty was encountered in getting the journals to run true within a limit of 1 thou. in my own case.

Fitting the Clamp Bolts

A simple jig, consisting of a pair of standard vee blocks, with clamps to mount the shaft on a truly flat surface, was employed for the cross drilling of the webs to take the clamp bolts. Needless to say, the pair of vee blocks should be a pair in the true sense, that is, identical in height and alignment. I happened to have an old tee-slotted table on which to mount the vee blocks, but any true, rigid base will serve. If a planer or shaper is available it would pay to fix the blocks to the base and plane the vees *in situ*. Readers will remember that a somewhat similar operation was employed in making the crankshaft for the "Craftsman Twin" two-stroke engine.

A packing piece may be found desirable to prevent any tendency of the shaft to turn under drill pressure, after the webs have been set truly horizontal. They may then be drilled and remade to take the clamp bolts a tight push fit.

It may be mentioned that the first bolts fitted (as shown in the photographs) were ¼ in. diameter, with round heads, turned from aircraft engine bolts. But despite the fact that the steel was of about 80 tons tensile strength, the bolts were found to stretch when tightened so that they became loose in the holes, and lost the property of keying the parts in true location. The size of the holes was, therefore, increased to $\frac{5}{16}$ in. and double-ended bolts, as shown in the detail drawing, made of the same steel, with tapered shoulders so that they "steered" the parts into position when inserted. To prevent the nuts slackening off, "shakeproof" washers were fitted on each side, but other forms of keeps may be used at the constructor's discretion.

(To be continued)

A 1½-in. Scale Aveling Steam-Roller

By R. Forster

THE photograph reproduced herewith shows a 1½-in. scale model steam-roller which has been under construction for about five years, and is now on the way to completion.

The prototype was built by Aveling & Porter in the early twenties, being of the piston-valve type and fitted with a Morrison scarifier.

The boiler, made from 3/32-in. steel plate, is approx. 11 in. long excluding smoke-box and horn-plates, is double riveted on the flat surfaces, and contains 450 rivets and 155 screwed stays, as in the prototype.

The firebox is made from copper and contains seven ⅜-in. tubes and two ½-in. tubes.

The fittings consist of two sets of water-gauges and a pump fitted to the right-hand side, driven from the crankshaft; it is hoped to fit a Penberthy injector on the left-hand side, and provision has been made for this, as an Aveling type clackbox is fitted to the boiler. There are also three washout plugs on the foundation-ring level, and a man-hole cover on the left-hand side of the boiler.

The road wheel centres are built up in the usual way, and are bolted to the rims, which in turn, are fitted with wearing plates which are riveted to them. The steerage fork and front saddle are fabricated from steel plate.

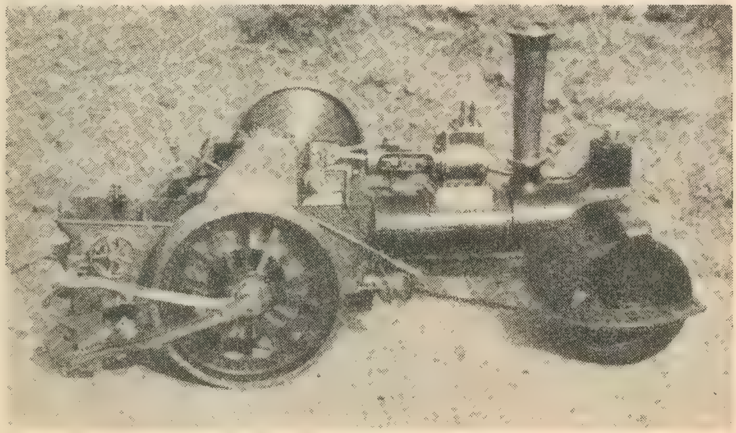
Brass was used to fabricate the cylinder, which is secured to the boiler with eighteen studs and nuts. A piston valve is fitted to the cylinder, and the regulator is incorporated in the jacketed steamchest.

The crankshaft brackets are another example of fabrication; no fewer than twenty pieces of metal went into the construction of each bracket.

Not possessing any means of cutting the gears, I had to cut all the teeth by hand, and about 600 teeth were cut before I was satisfied with the four pairs required. The first and second inter-pinions are detachable from the rims, as in the prototype. The tender is made from copper plate and is fitted with the standard gear, such as scraper brackets and brake-gear, reversing-gear, etc.

The scarifier was quite an interesting job, especially the fabrication of the line holder, which presented quite a problem owing to its peculiar shape; but after a deal of thought, a way was found to get over it. Balance springs are fitted, and it works quite well.

All the road wheels are fitted with mud scrapers.



Mr. Forster's 1½-in. scale Aveling & Porter steam-roller

Open Day a

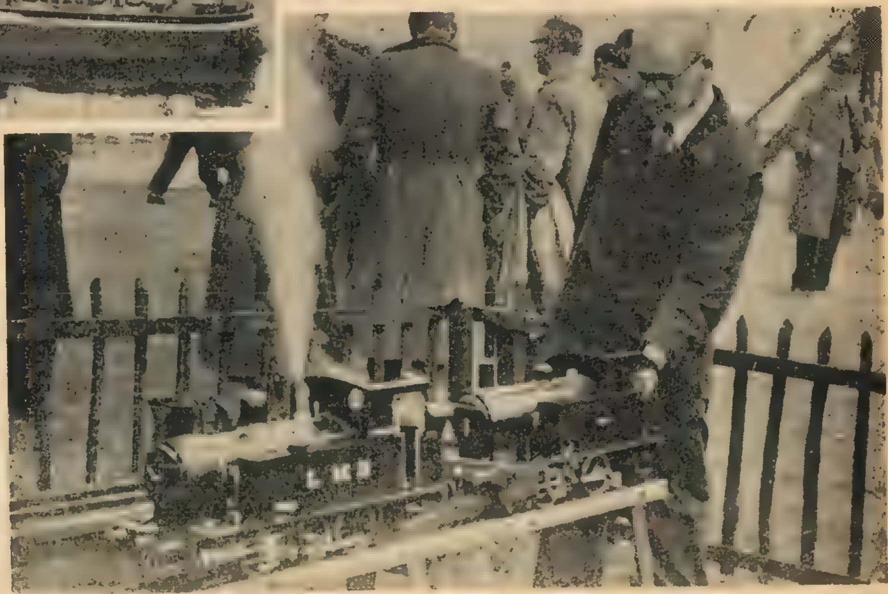
Photographed by

H. Foster with his *Doris* before taking her on the 3½-in. gauge circuit. This engine has done between two and three years' running, a tribute to "L.B.S.C.'s" "words and music."

Altair is a 5-in. gauge free-lance 2-6-2 locomotive built by S. Ibbotson, who is seen here getting her ready for a spell on the track, where, incidentally, she performs well. Locos on these short tracks in the steaming bay can be carried to the main track on a traverser which normally forms part of the circuit.

This model of R.M.S. *Stirling Castle* looks very well on the water; it was built by L. Aspinall, and is electrically propelled. The hull is built bread-and-butter fashion, and is 44-in. long, to a scale of 27 ft. to the inch. The vessel is well-detailed, and was built in about 18 months.

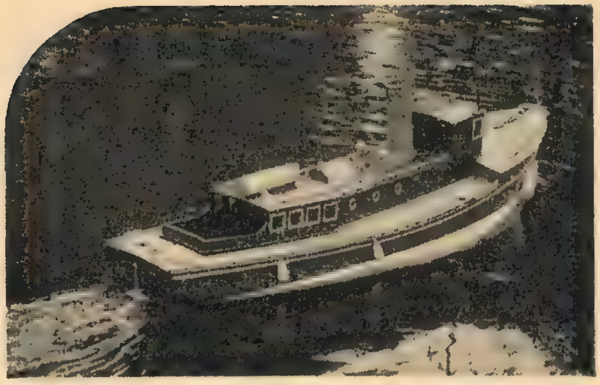
In the steam-raising bay, H. Williams watches his inch-scale G. and S.W.R. 0-6-0 tank engine as she demonstrates a full head of steam. This is a "first attempt," but the loco hauled fifteen cwt on her initial tryout. She took 4½ years to build. The 0-4-0 tank was built by H. Byram.



t Brighouse

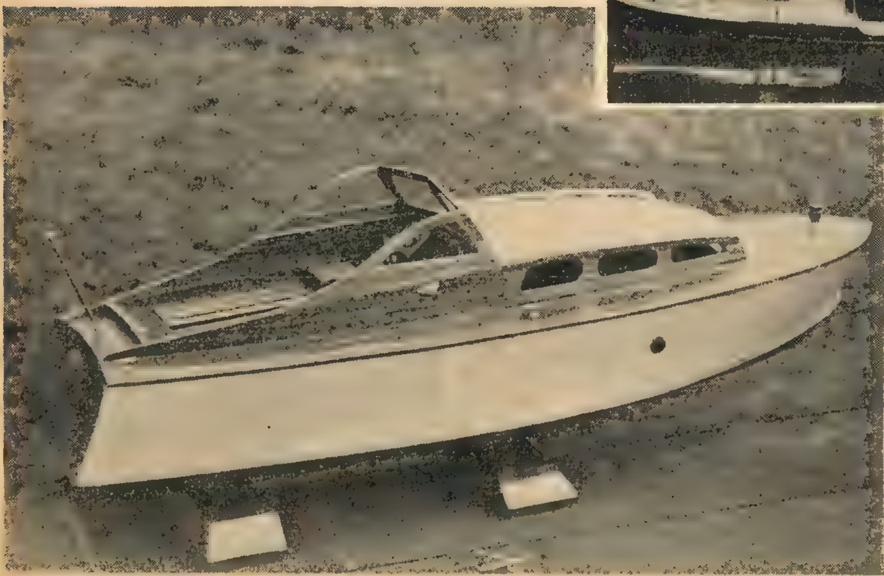
"NORTHERNER"

On the 70-ft. diameter pond, Dr. T. Fletcher's pilot-cutter looks very well at about half-speed.



A relatively quiet spell at the station. On the $7\frac{1}{4}$-in. gauge track is W. D. Miller's fine *Duchess of Brighouse*, which was in steam for many hours. In the foreground is the raised, $3\frac{1}{2}$-in. and 5-in. gauge track; both run parallel on a continuous circuit of about 200 yards.

E. G. Bottomley sets off his radio-controlled tug *Zwarte Zee*, which is electrically propelled. The hull is 53-in. long, with bread-and-butter sections at stem and stern, joined by three planks forming the sides and bottom of the centre-section. This boat won the President's Cup at the last Brighouse exhibition.

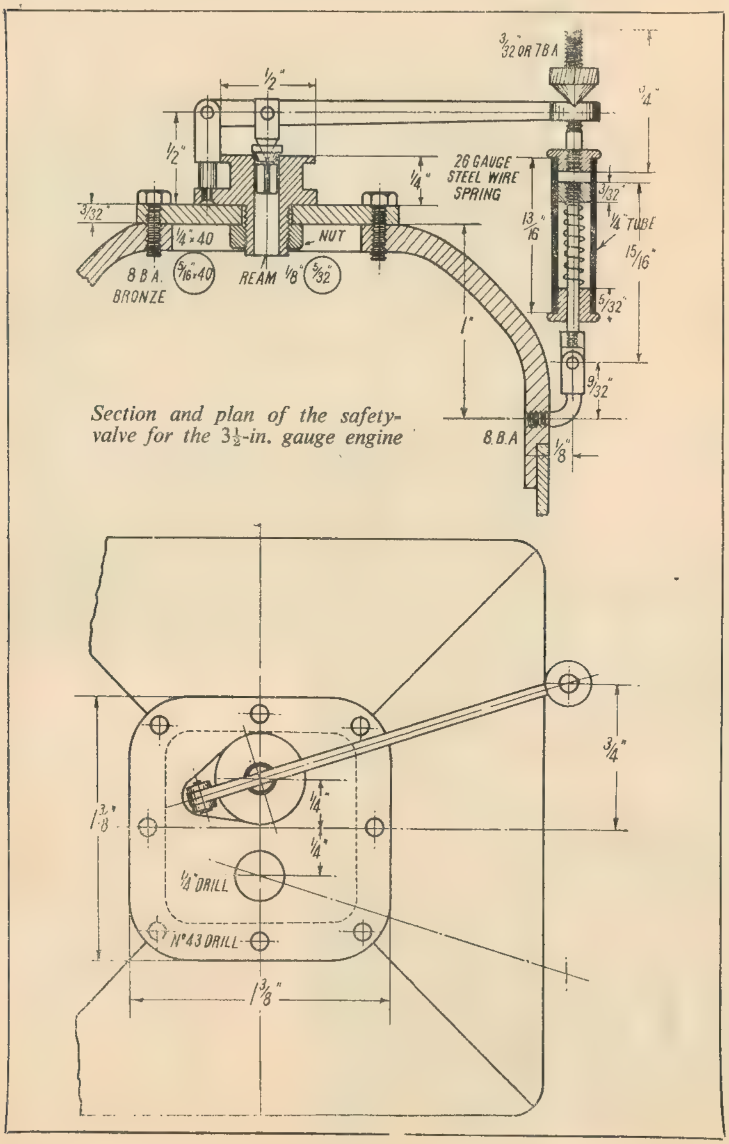


This beautiful cabin-cruiser was built by G. Harrison, the Brighouse secretary. The hard-chine hull is 24 in. long, built on frames and stringers, and is driven by a commercial diesel engine. Deck and cockpit are neatly planked in veneer, and the boat runs as well as she looks.

L.B.S.C.'s Titfield Thunderbolt

DETAILS OF SAFETY-VALVES

WHEN I described the spring-balance safety-valve for *Invicta*, there was the usual moan from the "club oracles"; it was unreliable, difficult to make, leaky, and so on and so forth. A few beginners listened to these words of unwisdom, fitted direct spring valves, and ruined the appearance of the old lady, who looked like grandma in a teenager hat. I hope nobody does the same with the *Tit*; and I'll tell you right here, that if the valves are made with the average amount of skill, which all readers of these notes possess (if they didn't, they wouldn't be readers) they will be found just as reliable, and work as well as any modern form of valve. Also, they are decidedly more picturesque in action.



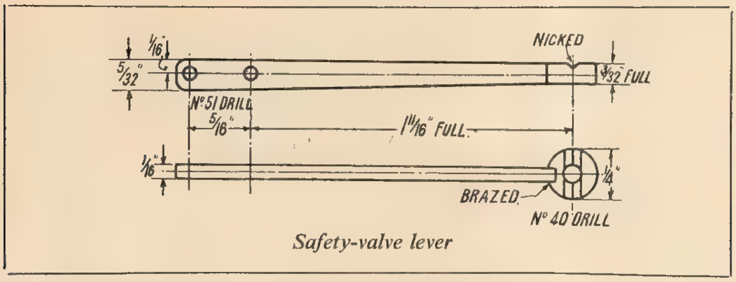
Section and plan of the safety-valve for the $3\frac{1}{2}$-in. gauge engine

First item is to make the manhole cover. For the $3\frac{1}{2}$-in. gauge engine, you'll need a piece of brass 3/32 in. thick, and $1\frac{3}{8}$ in. square. Round off the corners to match the faced flange on top of the haystack dome, and drill eight holes with No. 43 drill, as shown in the plan view. Hard-rolled brass plate will be found flat and smooth enough to make perfect contact with the faced flange, and a gasket of 1/64 in. Hallite or similar jointing, will render it steam-tight when erected "for keeps." Mark the centre-line; and on this, at $\frac{1}{4}$ in. each side of centre, drill a $\frac{1}{4}$ in. clearing hole for the stems of the valve bodies. The valves are not screwed into the manhole cover, as they have to be set at an angle, and are easy to adjust in exact position, if free in the holes; they are secured with a nut underneath the cover, when correctly set.

The cover for the 5-in. gauge engine requires a piece of brass $1\frac{3}{4}$ in. square, and $\frac{1}{8}$ in. thick. Round off the corners, and drill sixteen No. 43 holes for the fixing screws. The holes for the stems of the valves are set $\frac{1}{4}$ in. each side of centre as before, but use $\frac{5}{16}$ in. clearing drill. Clean off all burring, by rubbing on a piece of fine emerycloth, or similar abrasive, same as if you were truing up a portface. Truly-surfaced joints are easy to keep steam-tight.

Valve Bodies

The valve bodies can be made from castings, or from round rod; bronze or gunmetal for preference, but brass will do at a pinch. Use $\frac{3}{4}$ in. round for the $3\frac{1}{2}$-in. gauge engine, and 1 in. for the 5 in. job. Chuck in three-jaw, face the end, and for the smaller engine, turn down $\frac{1}{4}$ in. length to $\frac{1}{4}$ in. diameter, screw $\frac{1}{4}$ in. $\times$ 40, and part off at $\frac{1}{4}$ in. from the shoulder. For the bigger engine, turn down $\frac{5}{16}$ in. length to



Safety-valve lever

$\frac{5}{16}$ in. diameter, screw $\frac{5}{16}$ in. $\times$ 40 or 32, and part off at $\frac{5}{16}$ in. from the shoulder. Reverse in chuck, holding in a tapped bush, and turn the outside to the given outline and size. Centre the end, and drill through with No. 34 drill for the smaller engine, reaming $\frac{1}{8}$ in. or No. 23 drill for the larger job, reaming 5/32 in. Take off the sharp edge of the hole with a centre-drill in the tailstock chuck. Note: leave the bottom flange on either valve, the full diameter of the rod from which you turned it. It will be filed to the pear shape after the fulcrum post is fitted. The hole for this on the smaller engine is drilled No. 48 at $\frac{5}{16}$ in. from centre; and on the larger, use No. 40 at $\frac{3}{8}$ in. from the centre. Countersink the underside, see section. Make nuts to fit the shanks from hexagon brass rod, a simple job that needs no detailing.

Valve Parts

Illustrations for the oddments for the 3$\frac{1}{2}$-in. gauge engine are given here, and those for the 5-in. job are just the same in shape, merely slightly differing in size. The fulcrum post is just a glorified valve fork or clevis, made the same way. Slot the end of a piece of $\frac{1}{8}$ in. or $\frac{3}{16}$ in. square rod, by the method described for valve forks, and part off at sufficient length to allow for turning the stems; drill the cross-hole and round off the top. Chuck truly in four-jaw, and turn the stems to dimensions shown, for 3$\frac{1}{2}$-in. gauge engine. For the 5 in. turn the round part under the fork, to about $\frac{1}{8}$ in. diameter, and the spigot to fit tightly in the No. 40 hole in the flange. Press in, rivet the ends of the spigots into the countersink, and file flush. Be careful to avoid spoiling the contact face of the flange, which can then be filed to the shape shown in the plan views.

The valves are turned from round bronze or gunmetal rod held in the three-jaw, the stem being turned to a sliding fit—not too tight—in the hole through the body of the valve. The easiest way that I know of, to get the correct angle on the valve, so that it matches up with the valve seating, is to put a square or oblique-ended tool in the slide-rest, and a centre-drill in the three-jaw. Then run the slide-rest up to the centre-drill, and adjust the tool, so that the cutting edge is flush with the angle of the centre-drill. Tighten the clamp, and carefully form the taper on the valve, by feeding straight in. The resulting taper will naturally be the same as that on the centre-drill; and as the latter was used to form the seating in the valve body, they just can't help fitting exactly.

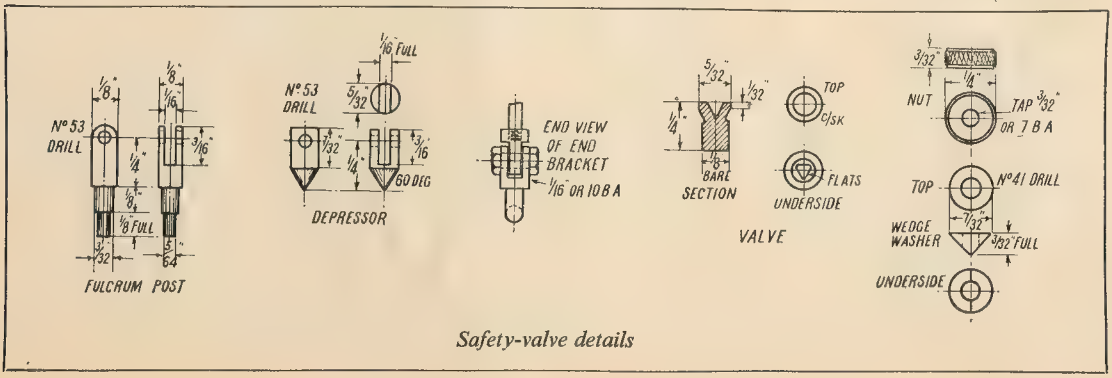
To form the flats on the stem, slack the chuck jaws and push the turned part back in the chuck, until the taper part is just inside. Tighten jaws again; then with a safe-edge file, file a flat on the stem, with one of the chuck jaws vertical. Ditto repeato with each of the other two jaws vertical, and there are your flats. Pull the piece a little way out of the jaws again, part off just above the taper, reverse in chuck, holding by the "lands" left between the flats, lightly centre, and make a countersink as shown. A 1/32 in. slot may be sawn across the top of the valve, so that a screwdriver can be used to do a wee spot of grinding-in before final assembly.

The trick in making the depressor which holds the valve on the seating, is to face off the end of the rod first, then slot it, and drill the cross-hole for the pin. Then part off to full length, rechuck with the parted end outwards, and turn the cone point to a little sharper taper than the point of the drill used for making the countersink in the valve.

The lever is just a piece of flat steel, rustless for preference, filed or milled to the size shown. The small end is furnished with a boss for taking the pressure of the balance; this is simply a slice of steel, to the dimensions shown, with a hole drilled through it for the balance spindle, and a "V" filed across the hole, after the boss has been brazed to the lever. Fit the lever to the boss as shown, the lever fitting tightly into a nick filed in the edge of the boss, so that it will not shift during the brazing operation.

Spring Balance

The spring balance is really a little cylinder with a body as thin as British Railways lion, and as long as a Jerry poodle. The body or barrel can be made from a bit of $\frac{1}{4}$ in. thin brass tube—same kind for both 3$\frac{1}{2}$-in. and 5-in. gauge engines—and it doesn't matter a bean about the inside being very smooth or true, as the piston doesn't have to be steamtight. Square off both



Safety-valve details

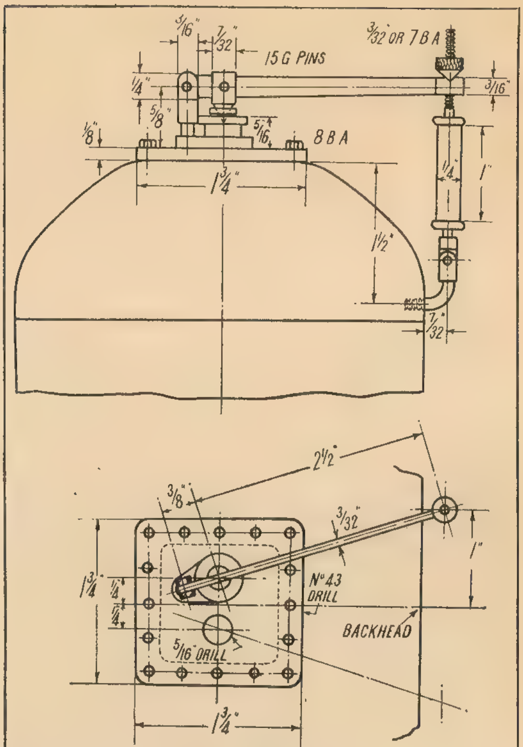
ends in the lathe, to the sizes given in the illustrations. The end covers, or plugs, are turned from ⅜ in. round rod, and should be a squeeze fit in the bore of the tube; as they are turned similar to the way described for the covers of piston-valve steam-chests, *that* bit needn't be repeated. Drill a No. 51 hole through the bottom plug, for the piston-rod to slide in easily. The top one is drilled and tapped for the adjusting spindle, which is made from a bit of 3/32 in. round steel, to the given lengths, and screwed in tightly.

The piston is merely a slice of round brass rod, screwed on to a length of 1/16 in. round steel, no "mike" fitting being necessary. The easier it fits, the more sensitive will be the action of the valve. The crosshead is a weeny bit of ⅛ in. round rod, screwed on to the end of the piston-rod, and has a flat filed or milled at each side of it, to form a tongue which will fit into the slot in the anchor bracket; see end view in the detail illustrations. The anchor bracket itself, is made from a bit of ⅛ in. square rod (bronze is the best for this job, on account of its being screwed into the firebox casing) which is slotted 1/16 in. wide, and cross-drilled No. 51, in the same way as a valve fork. Part off about 1 in. from the end, chuck truly in the four-jaw—my four-jaw self-centring chuck mentioned in the Myford dissertation, saves bags of time when doing jobs like this—and turn down about half of it to 3/32 in. diameter, reducing the end just a tiny shade more, and screwing 8 B.A. Bend this at right angles; not a sharp angle, but an easy bend, as shown in the drawing. Drill and tap corresponding holes in the back of the haystack dome casting, at the distances shown in the illustrations, from top and centre lines, and screw in the anchor brackets with a taste of plumbers' jointing on the threads.

The dimensions of the spring balances, all except length, are similar for both 3½ in. and 5 in. gauge engines; and even in the latter, they are over "scale" size, as a study of a photograph of the ancient and honourable old dame herself, will reveal. They have to be so, on account of ensuring satisfactory working; one more example of the fact that nature won't be "scaled." However, if carefully and neatly made, the safety-valves will work perfectly, with a realistic and somewhat fantastic action, and will look just the cat's whiskers.

Adjustment is made, as in full size, by a knurled nut bearing on a wedge-shaped washer, the edge of which engages with the nick in the boss on the end of the valve lever. The nut is a slice of ¼ in. round brass rod, drilled and tapped to suit the adjusting spindle, and knurled to afford finger-grip. Incidentally, it is very seldom indeed that I ever use a regulation knurling-tool for these weeny nuts, hand-wheels for boiler fittings, and suchlike small jobs, although I have several. In the present instance, I'd just chuck a bit of ¼ in. round rod, face the end, centre, and drill No. 48 for about ¼ in. depth, tap 3/32 in. or 7 B.A., and run the parting-tool in at about 3/32 in. from the end, to about 1/16 in. depth. Then, while the lathe was still running, I would just press the face of a 6 in. second-cut flat file on the edge of the partly-parted-off (say that quickly !) nut, letting it run across as the nut revolved. About three traverses, pressing the file down hard, gives a swell knurled surface, better than the regulation wheel, and in a fraction of the time it takes to change the tool and set up the wheel, in the slide-rest. Slightly chamfer both edges of the wheel or nut, to avoid cut fingers when operating, finish parting off, and rub the parted side on a bit of emerycloth, to remove any burring.

To make the wedge washers, chuck a bit of ¼ in. round rod in the three-jaw, and turn down ⅛ in. or so to 7/32 in. diameter. Face the end, centre, and drill about ⅛ in. depth with No. 41, drill. Remove from chuck, and file the end of the rod to the wedge shape shown; replace in chuck, and part off the wedge-shaped portion. Ditto repeato, and there you are, as the farmer said to the paratrooper who landed in the middle of his duck pond.



Elevation and plan of safety-valve for the 5-in. gauge engine

Assembly and Erection

Put the lever between the jaws of the slot in the fulcrum post, and pin by squeezing a bit of 1/16 in. silver-steel through the lot. Repeat operation with the depressor, which goes over the second hole in the lever, and be sure that both post and depressor will swing freely "without let or hindrance," without being "sloppy." If too tight, the lifting pressure will vary, and the valve won't close down steamtight. Put the valve bodies in place in the holes in the manhole cover, and tighten the nuts underneath, just enough to hold the bodies, yet allowing them to be twisted by hand. Put the manhole cover in place, with a couple of the fixing screws to hold it temporarily. Assemble the spring balances as shown, putting a light spring, made from 26-gauge steel wire, on each piston-rod. If the plugs are a good tight fit, no pinning or screwing is needed, as the spring pressure is very light, even with boiler pressure at 80 lb. Fit the tongue at the bottom of the piston-rod to the slot in the anchor bracket, and secure with a 1/16-in. bolt, or bit of wire screwed and nutted

(*Continued on page* 20)

Why not *make* a Pressure Gauge?

By E. B. Hughes

I HAVE often been struck by the number of times descriptions of models in these pages end up with, "the only item not made by the builder is the pressure gauge," or words to that effect. Are these instruments, I wondered, too much for the amateur who will cheerfully tackle a 3- or 4-cyl. scale locomotive with all the labour, intricate work and patience it entails? One seldom hears of them being home-made, although it is true three or four articles have been published in the past 20 years on how to make them—are these writers super-men? These thoughts caused me to start looking up back numbers, and in the issue as recent as January 10th, 1952, I found an article by Mr. K. Evans on the subject. It seemed clear and fairly simple, so I said to myself, "let's have a bash and find out if there is any reason why we model engineers nearly always funk this part of our boiler's equipment."

I secured some 0.005 in. shim from a friendly garage, and found no difficulty in making the tube. A piece of shim was cut to size to allow as small an overlap as possible when bent round the former, and the joint silver-soldered over a *low*, I repeat, *low* bunsen flame, no blow-pipe being required. Speed and not too much heat is the keynote here, as this light material will burn into holes if kept bright red for a second or two. The *bending* of these tubes I found more difficult. I tried filling in turn with string, salt and resin, but all the results were offensive to the eye (nevertheless these tubes appear to function quite well). I then found some narrow steel corset bones, presented to me some time ago by my wife (they make wonderful boiler bands), and by inserting two of these through the tube and bending in stages I achieved reasonable success. Unless the bending is done in *stages* the bands will straighten out the tube again, as they are withdrawn, so it is necessary to bend the tube a little, withdraw the bands and give them a more curved set before pushing them back, repeating this process until the required curve is reached. Kinks can be rolled out from time to time, and the tube can be softened half-way through the operation—it will be hard again by the time it is finished.

Mr. Evans gives a quite ingenious adjustable wire hook for the connecting link between tube and spindle but alas! I felt that the drilling of two 0.01-in. holes through 3/32-in. rod was hardly up my street, so I devised the spindle as shown in sketch. This, of course, is not adjustable for throw, but is simple to make, and effective. I use $\frac{1}{8}$-in. rod, and after the ends have been turned down to $\frac{1}{16}$ in. for bearings, a saw-cut is made *along* the spindle down to the lesser diameter. After the centre has been filed away for link clearance, the link can be dropped into position with its wire crankpin fitting into the saw cuts, the wire being secured with a spot of solder. Mind the solder doesn't spread to the link and make the whole job solid!

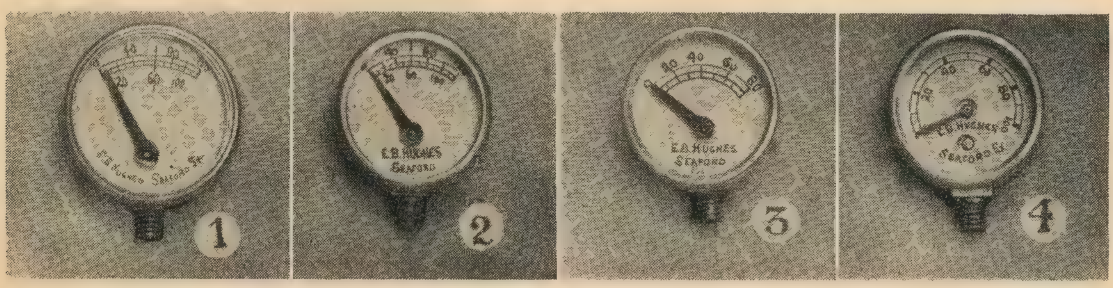
Other slight alterations I made from Mr. Evans's drawings were:—

1. A piece of brass the width of the tube is given a 90-deg. twist, and serves as a plug for the end of the tube and anchorage for the connecting link-pin.
2. The slot in the column is slightly diagonal instead of horizontal, so that there is no sudden bend in contour of the tube.
3. The dial is not screwed to the column, but is shaped with a small lug on either side which fits into slots filed in the case, thus locking dial in position.
4. No screws are used to fix outer case. It is turned a nice push-on fit to inner case, and needs no further fixing. There are no screws which might possibly foul the tube.

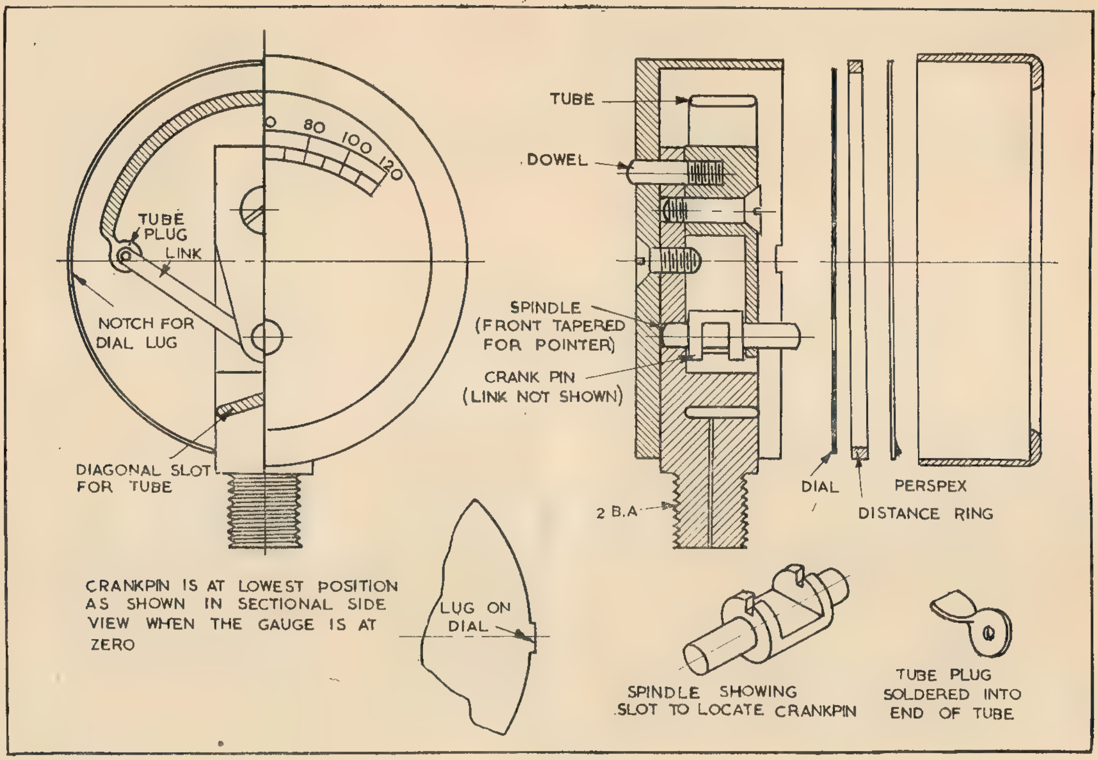
I am not suggesting that these deviations are great improvements, but they seemed easier to me, and I take the line of least resistance.

The first gauge I made (No. 1), much to my surprise I admit, worked perfectly, although the range of needle movement was less than I had hoped for, so I secured some, (as I thought) thinner shim—it felt about half the thickness—and made No. 2, but it had approximately the same amount of movement, and I found on "miking" the material it was also 0.005 in. in spite of its feel. I then found some 0.0035-in. shim, and made No. 3, which gave a much more open reading, and registers to 80 lb. only in place of the 120 lb. of the first two.

All these three gauges worked well. I have proved (to my own satisfaction) that anyone who can build a model locomotive could make the pressure gauge if he wished to. Success had gone to my head, so I decided to make a concentric needle one with the aid of a pinion and



Not one, but four gauges, all made in the same way and varying only in the amount of swing of the pointer



wheel from a wrist watch (No. 4). One really requires three or four watches for this job, because if you drop the pinion on the floor, you may never find it again. The laws of gravity do not appear to apply to these small bits, and unfortunately you can't tie a piece of cotton on to them. However, the gauge was eventually assembled and put in working trim. Possibly owing to the fact that there are four bearings and two sets of cogs, this particular gauge is apt to move in 5 to 10 lb. spasms at times, but it works well and gives a very open reading. It is quite likely that this latter feature *shows* what the closer reading ordinary type conceals, i.e., lag caused by friction of bearings.

Gauge No. 1 is 1 5/32 in. diameter and the other three 1 in., the sizes being determined by four old union-nuts which were used for the outer cases. Inner cases were built up from scrap sheet brass.

Any maker of these would be well advised to give a water test when the tube has been assembled. Slight leaks in joints can be easily seen before it goes in the case, and can be easily made tight. It is annoying to find there is a leak *after* assembly. Moisture on the glass, if in steam, is a sure sign of a slight leak, of course. One gauge quite refused to work, and it took me some time to find out that I had forgotten to drill the connecting hole through the bottom of the tube after it was soldered in. In this case I had *not* used commonsense and applied a water-test earlier—I was a little *too* sure of myself !

I hope this description of what has been made by an average, and by no means expert, reader will encourage others to make their own gauges. I personally would rather make one (not pattern 4) than an injector, and can assure readers that there is no snag in the making at all. I pay due tribute to Mr. Evans for his article, and hope mine, with the photographs of actual gauges, will convince those who have fought shy of making this essential fitting that it *can* be done, it works, and it is not outside the scope of the ordinary amateur.

L.B.S.C.'s TITFIELD THUNDERBOLT

(*Continued from page* 18)

both ends. Adjust valve bodies, until the bosses on the ends of the levers, drop over the adjusting spindles.

Remove manhole covers, and tighten up the nuts under the valve bodies to prevent further movement; if a taste of plumbers' jointing is applied to the threads before putting on the nuts in the first place, steam-tightness will be assured. Replace manhole covers, with a 1/64 in. Hallite or similar jointing gasket between the contact faces, and anoint the screws with plumbers' jointing. Same size screws are used on both engines, but the larger one has more of them. Put a tiny smear of grinding paste as used for automobile engine valves, or a scraping off your oilstone, on the valve tapers, and grind them in with a few twirls of a screwdriver in the sawcuts. Wash off, replace valves, drop levers in position, put on the wedge washers and knurled nuts, and listen for the cheers from Inspector Meticulous !

MAKING A SIMPLE BALL-TURNING TOOL

By "Duplex"

FOR merely ornamental purposes, balls and spherical curvatures are often turned in the lathe quite satisfactorily with hand tools alone. With care, an accurate finish can be obtained by working with a template as a guide, or a tubular tool with a bevelled cutting edge is sometimes used; in fact, ivory billiard balls used to be turned with a tool of the latter kind, having a mouth somewhat less in diameter than that of the finished ball.

However, the work is greatly simplified by employing a mechanical device, designed to give geometrical accuracy without depending on the skill of the operator.

In the early days of the workshop, the attachment illustrated in Fig. 1 was specially made for turning the ball tops of some brass ornamental pillars, and it has since proved most useful even where accuracy is essential, as in machining the engine parts shown in Fig. 2.

Making the Tool

The soleplate, illustrated in Fig. 3, consists of a length of mild-steel plate, filed or machined flat on both sides and then drilled to correspond to the centres of bolts engaged in the T-slots of the lathe cross-slide. In addition, the plate is drilled and tapped $\frac{5}{16}$ in. B.S.F. for the screw securing the pivot member. A casting was used for the body of the attachment, but this can quite well be made from stock material in two parts, firmly secured together by screws inserted on the underside.

The base is first drilled for the central screw and is then mounted on the lathe faceplate, with the drill hole running truly, to enable the recess for the pivot member to be accurately machined. The latter part is firmly fixed to the soleplate by means of an Allen cap-screw, and both the diameters and the lengths of the shoulders formed on the part are accurately machined, in order to afford a close-fitting bearing for the body of the attachment; this is important to ensure the satisfactory working of the finished tool. The slot for mounting the tool-bit can either be machined in the lathe or shaping machine, or it can be cut out roughly to shape with the hack-saw and afterwards finished by filing.

The tool-bit is clamped in place by two 2-B.A. or $\frac{1}{4}$-in. B.S.F. grub-screws. For convenience of working, the operating handle is mounted at an angle to the line of the tool.

The handle should be made long enough to afford ample leverage, so as to give good control of the tool when the cutting pressure is applied. The device for centring the attachment in relation to the lathe axis is illustrated in Figs. 7 and 8; this is screwed into the soleplate after the Allen cap-screw has been removed. The fitting must be accurately machined in order to ensure that the coned point lies centrally in relation to the pivot bearing. One method of machining the centring device is to grip a length of hexagonal material in the self-centring chuck, and then to shoulder down and thread the end. At the same setting, a broad

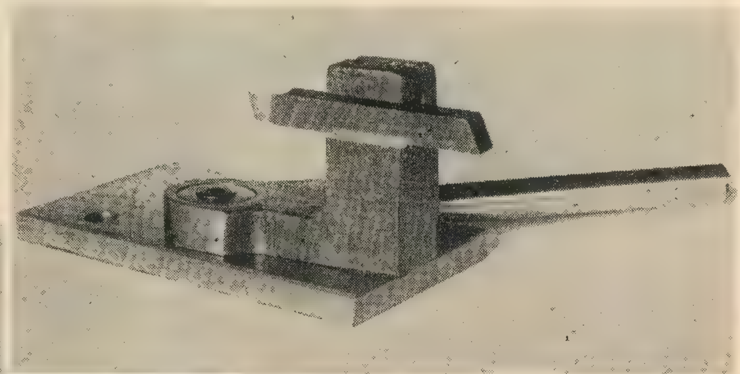
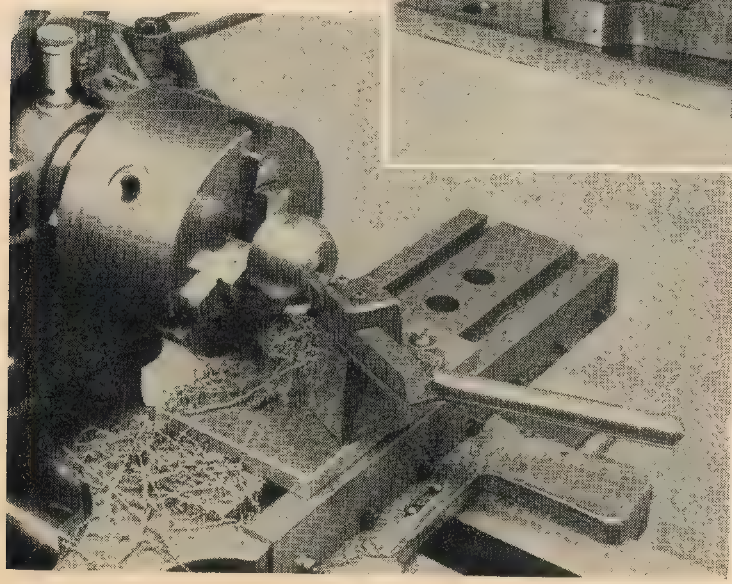


Fig. 1. The finished ball-turning attachment



Left: Fig. 2. Machining an engine fitting with the attachment

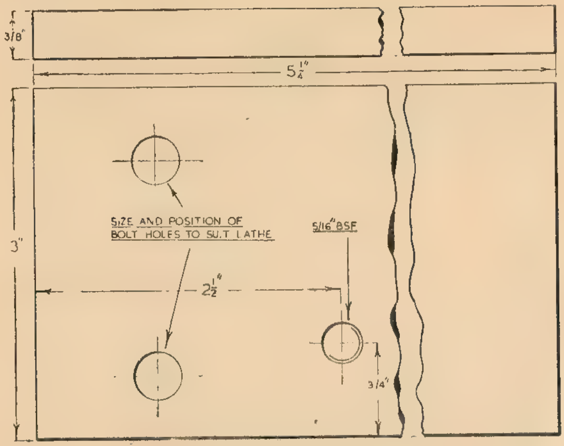


Fig. 3. The sole-plate

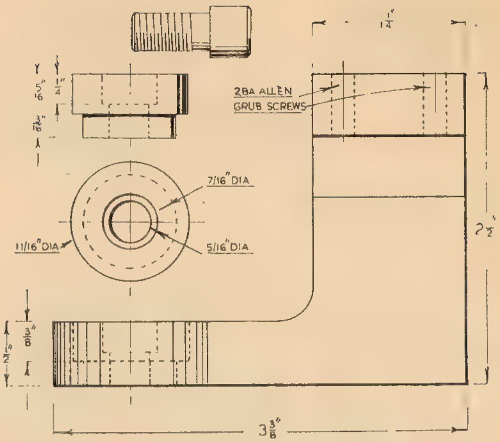


Fig. 4. The body of the attachment and the pivot collar

groove is turned to correspond to the position of the coned point. The work is next mounted by the threaded end in the four-jaw chuck, and the groove previously turned is set to run truly with the aid of the test indicator. The surplus material is now parted off and the cone is machined by setting over the top-slide.

Machining with the Attachment

The following series of operations is followed when machining a ball or a part-spherical surface. After the attachment has been firmly secured to the lathe cross-slide, the centring device is screwed in place and the slide-rest is used to bring the tip of the cone into line with a coned centre fitted to the lathe mandrel.

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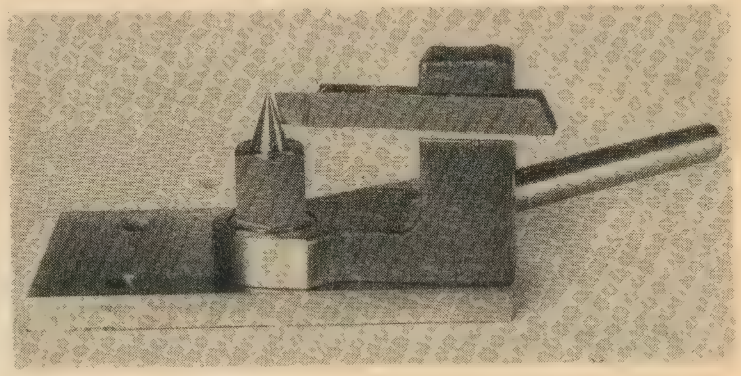


Fig. 7. The coned centring device in position

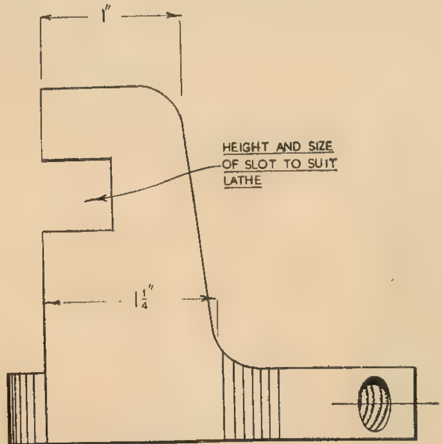


Fig. 5. Showing the position of the tool housing and the handle mounting

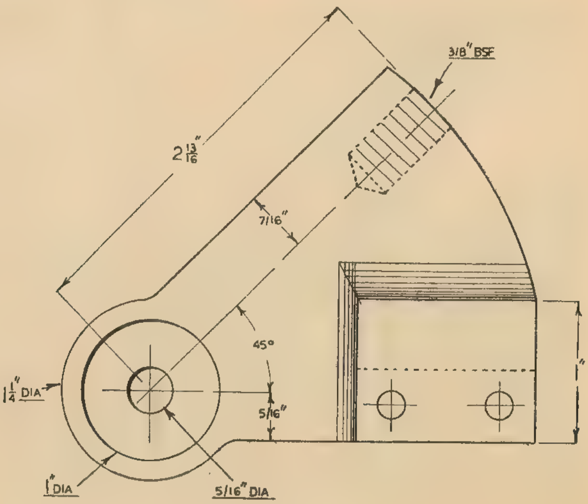
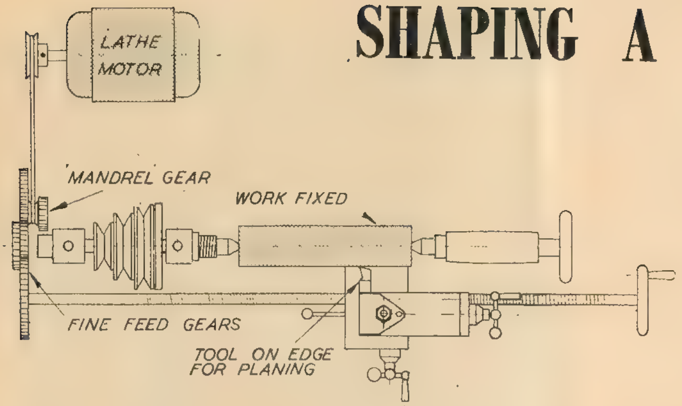


Fig. 6. Plan view of the base of the attachment



SHAPING A LONG KEYWAY IN THE LATHE

By W. J. Hughes

A DESCRIPTION of an ingenious method of shaping a long keyway was sent to me recently by Trevor Whitaker of Cardiff, and with his permission I am passing it on for the benefit of other readers who may have a similar problem.

Mr. Whitaker was building the "Turpin" dividing head, which involved the cutting of a keyway 7½ in. long by 3/16 in. wide by 3/32 in. deep. This was too long to be milled in the ML7, and the shaper at his club had not a long enough stroke either.

The only possibility, then, seemed to be to "plane" the keyway in the lathe, with the work stationary between centres and the tool on its side, racked to and fro. It looked like taking a long time, but what other method could be used? So the column was mounted between centres and "tied up solid," the tool ground and gripped in the toolpost, and two or three cuts were taken.

Then came the brain-wave! Off came the covers for primary drive and gear train, and it was found that if the motor-pulley were moved right to the end of the shaft, it came almost dead in line with the centre of the "mandrel gear"—that is, the cluster below the tumbler reverse.

A rubber belt was improvised from the liner sealing ring for a diesel engine, and slipped over the pulley and the cluster. The change-gears were set to give the finest feed possible, and thus driving the leadscrew, it was found that cuts could be taken easily with the planing tool 3/16 in. wide and 2-thou. deep, enabling the keyway to be cut much more quickly and easily than by hand racking.

This, of course, was only a quickly rigged set-up, but Mr. Whitaker suggests that it would be worth while to make a special vee-pulley with an extended boss to fit on the motor shaft. The vee of the pulley would line up with the centre of the tumbler cluster, and the belt would drive direct on that, or on to a further special pulley clamped in that place.

It seems to me that this tip is worth following up; it could be useful for all planing jobs, with short traverses as well as long ones.

A SIMPLE BALL-TURNING TOOL

(*Continued from previous page*)

The cross-slide index is then set to zero in order to indicate the position of the slide at the end of the machining operation.

The tool-bit is next set with a rule, so that the distance between the point of the tool and the tip of the centring device is equal to the radius required on the work-piece.

After the work has been mounted in the chuck and its end faced with the tool, the tool is traversed along the work for a distance equal to the radius of the finished ball. It is best to run the lathe at moderately high speed, as this helps to cover up any surface irregularities resulting from hand-feeding.

Light cuts are taken by feeding the cross-slide inwards and then swinging the attachment with as even a motion as possible.

Machining is continued until the cross-slide again returns to the zero position shown on the feed-screw index collar.

A little experiment may be needed to arrive at the best form of tool point for machining the neck of the ball to the finished shape. If the attachment has been properly made and the machining carried out with ordinary care, an accurate ball should have been formed on the end of the work, and this can be checked by measuring with the micrometer across the diameter in several places.

Hollow-spherical surfaces can be machined in the same way, but the tool is then set in advance of the vertical axis of the projected sphere.

The tool is adjusted by first setting its point to the tip of the centring device and then marking a line on the tool shank.

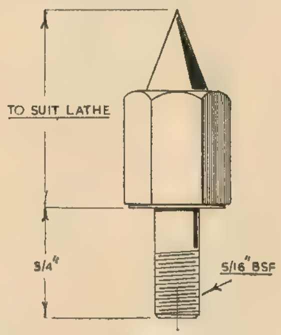


Fig. 8. The centring device

After the centring fitting has been removed, the tool is moved forward for a distance equal to the radius required.

The range of this form of hollow turning is, of course, limited by the shape of the tool mounting, and with the present attachment it will always fall short of the diameter of a hollow sphere.

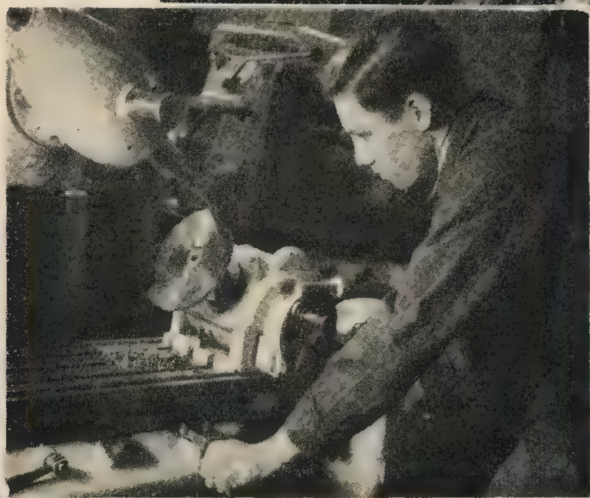
Cultivating Creative Craftsmanship

AUTOMOTIVE COMPANY'S EFFICIENT TRAINING SCHEME

By Guy Radcliffe

THE unfortunately widely held view on the part of parents that it is better for a boy to go in for a "white-collar" job than take up practical work holds little recognition in South Wales. This accounts in part for the success of the apprentice-training scheme of Girling Ltd., automobile brake and suspension-damper manufacturers, who have a large modern factory on the big trading estate at Cwmbran, near Newport. A school equipped with nearly £25,000 worth of different types of machine adjoins the main factory building, and there are three full-time staff instructors.

The company's training scheme started in 1947, at about the time that the factory premises were taken over for peace-time production and may be regarded as part of the plan to develop new engineering skills and build up light industry in that part of the country, to complement the potential of the long-established heavy coal and steel industries.



Above: Precision-setting of the jig for a vertical boring machine

Left: This photograph shows one of the apprentices using a profile cutter

Bottom, left: A student prepares to grind a milling cutter

The normal age of entry into the scheme is 16 years and the apprenticeship lasts five years. Twelve new boys are taken on each year. For the first six months they are on probation, during which time those who seem likely to have little aptitude for the training can be "weeded out."

On the basis of an apprentice's progress, his time-keeping and conduct, he is awarded a monthly bonus in addition to his regular pay. This bonus is not in cash but is paid in kind, in the form of caliper gauges,

combination sets, micrometers and other instruments and tools certain to be of use to him when he is a fully-fledged craftsman. Also, part of his practical training in the school is to make tools that will later be of practical value to him.

A Proficiency Test

Trainees begin to make these useful pieces of equipment after their initial six months. An early test of proficiency is to make the familiar square within a square. A later one is to make a hexagon within a hexagon. After this period, their practical work largely comprises making equipment required in the factory and the items produced are, in fact, put into service They include drills and reamers, milling cutters, press tools and form tools. The apprentices have, for example, built a valuable automatic machine for the fabrication of tubing which is now installed in the works.

Another tool made by the apprentices was a spherical turning machine, built to the company's own design, which gained a first prize in a national Eistedfodd. An 18-year-old trainee has made a universal sine-bar vice, for grinding or milling to any compound angle required, which is to be entered for a national competition. Thus the apprentice's handiwork is directly related to factory requirements besides giving them their skill with the lathes, grinders, shaping machines, universal millers, jig borers and other appliances with which the school is equipped.

Apprentices are entered for both the examinations of the City and Guilds Institute and the Ordinary and Higher National Certificates of Engineering. Since the commencement of the scheme, almost 100 per cent. success at the City and Guilds and Ordinary National Certificate examinations has been attained by trainees, and seven Higher National Certificates have been gained. This represents an achievement substantially higher than the national average, but it is, of course, to an extent due to the careful selection of trainees in the initial period.

Lectures

Education on the academic, as distinct from the practical side of engineering is gained by the boys in the school's lecture room, and they also attend local technical colleges one full day and one evening a week. A comprehensive technical library is kept at the school. As in the case of most modern training schemes, the importance of bodily fitness is not forgotten, and each morning's engineering instruction is preceded by half an hour's physical training.

The first two years of the apprenticeship are spent in the school itself, and the final three in one or other of the factory departments. The first-year syllabus covers office and stores routine, elementary bench work and simple lathe practice, shaping and turning. In their second year, trainees advance to milling, jig-boring and grinding.

General view of the workshop. In the foreground are some examples of student's work

The first part of the course completed, the boys are chosen on the basis of their individual progress and abilities for particular departments of the factory. Trainees who display qualities of leadership are selected for production engineering and are likely candidates for later promotion. Those who have marked skill with their hands are allocated to the tool room for the remainder of their course, where their ability can be best developed.

Suitable Work

Others may go to either the drawing office, the works engineering section, or to specialize in the setting and supervision of automatic tools, of which there is an impressive battery in the Girling plant. The aim with every boy is to place him in the work for which, by temperament and skill, he is best suited. This is fair to him and also ensures that the employers gain the fullest benefit from the training scheme.

A boy chosen for production engineering will learn in his third year how to use a capstan lathe and the fundamental techniques of automatic machines. Drawing-office routine, heat treatment and advanced milling are covered in the next year, and the final 12 months are devoted to advanced work with automatics. Apprentices in the tool room learn the techniques of heat treating, welding, drawing and pressing to augment their knowledge of machining and the basic elements of tool-making. The setting of automatics and the theory of cam design are also taught.

No Refresher Course

At the end of their five years course, the boys are due for National Service. It is interesting to note that as yet, it has not been found needful to provide refresher courses for them when they return on demobilization. The instruction is well ingrained but, furthermore, the boys usually become tradesmen in one or other of the arms of the service and gain even greater experience.

Esprit de corps, rather than individual competition, is fostered during the apprenticeship. The school has its own blazer and tie. Its football eleven has gained notable local successes. The keen attitude towards creative craftsmanship finds reflection in a team spirit that promotes loyalty to the company and a sense of dedication to engineering itself, as a life's work of profit and dignity.

READERS' LETTERS

Letters of general interest on all subjects relating to model engineering are welcomed. A nom-de-plume may be used, but the name and address of the sender must accompany the letter. The Managing Editor does not accept responsibility for the views expressed by correspondents

PADDLE-STEAMERS ON THE DART

DEAR SIR,—As a subscriber to your very interesting publication, and as one who has been acquainted with it with certain lapses since about 1908, I am fully aware of the interest taken by the model engineering fraternity in the older types of steam engine and their desire to preserve models of suitable specimens.

While I can lay no claim to amateur status, being a professional engineer, I am, nevertheless, very interested in model making, though unable at the moment to actively engage in it.

It has occurred to me, however, since taking up my present appointment last year as superintendent engineer to the River Dart Steamboat Company Ltd. of this town, that some of our fleet would be of interest to the steamer enthusiasts. I refer to our paddle steamers which date, in one case, from 1914, with another carrying an engine from a previous vessel and going back to the early 1900 period.

The vessels are fitted with inclined compound engines 12 in. and 24 in. bore by 24 in. stroke approximately, and are good examples of the period. I am quite sure that my company would agree to allow interested parties to inspect them by arrangement and to allow me to provide any information which might be of interest.

Yours faithfully,

Dartmouth, Devon. N. F. SCARBOROUGH, A.M.I.Mech.E.

PISTON-OPERATED STEAM ENGINE VALVES

DEAR SIR,—Mr. J. A. Bamford may be interested to know that a valve gear, similar to that described in his article in the May 6th issue was used in auxiliary equipment fitted to steam trawlers prior to the 1914 war.

I am not sure of the exact details, but I believe a spring-loaded poppet valve was used, located in the side of the cylinder.

Yours faithfully,

Lowestoft. C. WASTELL.

PLOUGHING ENGINES

DEAR SIR,—I was most interested to read the letter of Mr. Carnaghan in THE MODEL ENGINEER, May 6th, upon ploughing engines at Bishop's Stortford, partly because I have a one-third full size plougher under construction, and partly because from my workshop I often in spring and autumn see the engines or their sisters climb the hill to the road into North Essex.

There were at one time ten or eleven sets (20-22 engines); there are now only three sets left. These, however, are kept fully in work. The building date was 1918, and all heavy repairs are carried out on them at The Steam Plough Works, Dane Street, Stortford.

In addition to these there are other ploughing contractors in the area, as, for instance, Radwinter and Cambridge.

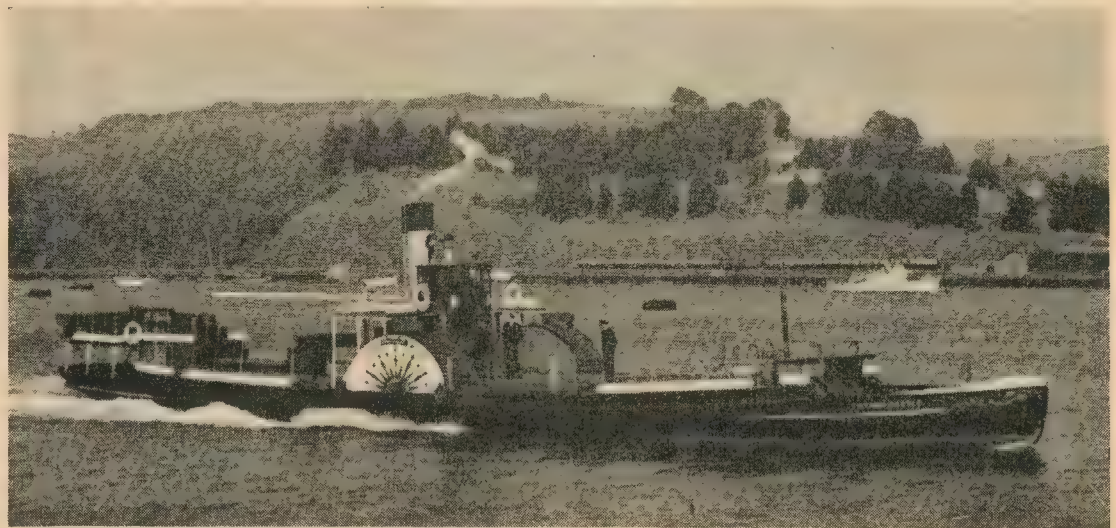
In conclusion, may I add to Mr. Thain's letter the names of three other firms of traction engine builders who "did not know any better," than to put the strakes "the wrong way round," they were J. and F. Howard of Bedford on their Farmers Engine; Tuxfords of Boston on some, at least, of their tractions, and engines built at the Bridge Ironworks, Ripon, by The North Yorkshire Steam Cultivating Co.

Yours faithfully,

Twyfordbury. "GASBAG."

ENGRAVING CUTTERS

DEAR SIR,—With reference to your reply to the query on "Re-sharpening Engraving Cutters" in the issue of THE MODEL ENGINEER dated March 11th, 1954, engraving cutters are of two main types: (1) with the flat face ground parallel to the axis, which is subsequently not reground; (2) with the flat face tapering towards the shank—these



The paddle steamer "Totness Castle" on the river Dart

are used for heaviest cutting. This face requires regrinding when necessary to bring the cutting edge or point concentric with the axis.

These cutters *are* backed off to a greater or lesser degree, depending upon the material being cut. The point of a conical cutter for even very fine work is truncated to maintain clearance in two directions for at least a few "thou."

Being an engraver by trade, I can, and am willing to, supply more detailed information to A. W. (Ashford, Kent), but I suggest he contacts the maker of the machine. If this is unknown, try Taylor, Taylor & Hobson, Stooghton Street Works, Leicester, the major manufacturer of engraving machines in the U.K., who will probably be willing to supply literature upon the subject.

Yours faithfully,
Perth, W. Australia. T. MADDIN.

A "VALVELESS" STEAM ENGINE

DEAR SIR,—In your issue of May 20th, 1954, you publish a letter from Mr. F. Rayner in which he asks for information about a model engine he has purchased. I recognise this engine as one made by Bowman Models, of this town, in 1949 to power their larger steam launches. I was partly responsible for the design and am pleased to be able to answer the reader's questions.

This engine has no real valve-gear. The inlet and exhaust ports are in the sides of the cylinder, about halfway down, so that they are covered by the piston except when the ports on the piston coincide with them. The piston is rotated to effect this by the connecting-rod movement, so that the steam port is open on the downward working stroke and the exhaust on the upward stroke.

A specially shaped steam port gave early cut-off, so that these engines used very little steam and were very reliable when well made. Unfortunately, the workmanship varied a lot and it sounds as if Mr. Rayner has a poor sample if it only ticks over at 50 lb. I have one that ticks over at 5 lb.

The boiler used with this engine was a flat-bottomed D-type, about 5 in. long, 2 in. high, and 3 in. wide, fired by a vaporising spirit lamp. The steam pressure was 15 lb. per sq. in., and it drove the 2 ft. long launch at 4 m.p.h.

Messrs. Bowman's are now extinct, so that explains why Mr. Rayner's letter was returned. Perhaps his engine is only a bit stiff, as I found they are much better when well run in. The steam should be slightly superheated by passing the pipe through the flame—this will double the power from this engine.

Yours faithfully,
Luton. F. J. BRYANT.

TIME AND MOTION STUDY

DEAR SIR,—It was with considerable interest that I read in a recent issue of THE MODEL ENGINEER an article on the subject of work study methods as applied to model making.

I have the feeling that this is an idea which will be received with very mixed feelings by many of your readers, meaning, of course, those who earn their daily bread under this system.

There are many arguments for and against this scheme, but I cannot think of anything in its favour when applied to model making except for professional model makers.

The majority of your readers, like myself, look upon model making purely as a hobby—a means of relaxation from the stress of the day.

After all, the great delight of our hobby is that one can potter about the workshop doing just what one fancies in the way, however inefficient it may seem from the work study angle, which affords one the maximum mental relaxation.

If one adopts your contributor's methods in one's model-making, then it will cease to be a hobby and becomes mere drudgery.

As one who during the past five years has endured the hair-bleaching experience of having my work as a marker-out "work-studied," I can assure you that at least one of your readers rejects the idea out of hand!

Yours faithfully,
"FREE THINKER."

G.E. LOCOMOTIVE COLOURS

DEAR SIR,—In the review of the Northern Models Exhibition in THE MODEL ENGINEER, page 524, May 13th, there occurs a statement with regard to an old model Great Eastern locomotive, "which was not in G.E. colours, being green."

Your reporter must be very ill-informed, or he would know that during the periods that Mr. Robert Sinclair and Mr. S. W. Johnson held office at Stratford, Great Eastern engines were painted green.

The G.E.R. was formed in 1862 by grouping, Mr. Sinclair then holding the office of loco. supt. He retired in December, 1865. From June 1866 to late 1873, Mr. S. W. Johnson held office. In Johnson's time, locomotives were painted a darker shade of green than in Sinclair's, with black bands and white lines, buffer beams green. Both of Mr. Johnson's successors W. Adams and Massey Bromley used black with red lines. The blue livery was introduced by Mr. W. Worsdell, who succeeded Mr. Bromley in 1881.

The first engines I believe to be painted thus were the 7 ft. 2-4-0 class numbers 562 to 571 built at Stratford in 1882-3. These were, by the way, fitted with Joy's gear, which was soon taken out. In the interests of accuracy perhaps the foregoing may be worth putting on record.

Yours faithfully,
Twyfordbury. "GASBAG."

STEAM LAUNCHES CN THE THAMES

DEAR SIR,—Re your recent reference to steam launch building on the Thames, it may interest readers to know that Messrs. Salters run a number of steamers on their Oxford and Windsor services which are fitted with superb Sisson triple-expansion engines.

Yours faithfully,
Bristol. "Student."

Next Week . . .

BLOWLAMPS AND BURNERS
The next article in the "Utility Steam Engines" series deals with methods of boiler firing, and includes a new design for a vaporising petrol-paraffin blowlamp.

A MECHANICAL MIXER
"Duplex" describes how to construct a useful motor-driven rotary mixer, using a converted surplus motor generator, which can be used for many workshop or domestic purposes.

AID FOR AMATEUR ACCOUNTANTS
Readers who find figures fatiguing will welcome the description of an adding machine which can be made quite simply in the workshop, utilising "surplus" instrument components.

EVERYTHING NEEDED
A steam locomotive is not of much use without a track to run on, or a train to haul. The builder of a *Brittania* describes how, having finished the engine, he persued the job to its logical conclusion by constructing a truck and a track.

LOBBY CHAT
Another of these ever-popular interludes in the steady flow of "words and music" from "L.B.S.C."

A SUPPLEMENT ON SOLDERING
We all have to learn how to solder and what type of solder and flux to use. A supplement is devoted entirely to this subject and forms a useful 8-page reference booklet that you will want to keep.

QUERIES AND REPLIES

"THE M.E." FREE ADVICE SERVICE. Queries from readers on matters connected with model engineering are replied to by post as promptly as possible. If considered of general interest the query and reply may also be published on this page. The following rules must, however, be complied with:

(1) Queries must be of a practical nature on subjects within the scope of this journal.
(2) Only queries which admit of a reasonably brief reply can be dealt with.
(3) Queries should not be sent under the same cover as any other communication.
(4) Queries involving the buying, selling, or valuation of models or equipment, or hypothetical queries such as examination questions, cannot be answered.
(5) A stamped addressed envelope must accompany each query.
(6) Envelopes must be marked "Query" and be addressed to THE MODEL ENGINEER, 19-20, Noel Street, London, W.1.

Camera Construction

I have obtained a set of aluminium die castings together with a general arrangement drawing for constructing a camera, but there are several points in the construction that I am not clear about, and I should be grateful for your advice on the following:—

(1) *What type of dark slides should be used?*

(2) *In order to accommodate the film back, I propose to remove the left-hand end of the slide-way, so that it would be possible for the slides to pass completely through the back. Is there any objection to this?*

(3) (*a*) *In the type of film back I propose to use, the film is bent back on itself. Is there any objection to this?*

(*b*) *Should the pressure plate be of polished aluminium, or should it be ribbed in the direction of film travel?*

(*c*) *In the arrangement for viewing the frame numbers, on the back of the film, is it necessary to provide a flexible light-tight joint between the box and the pressure plate?*

(4) *Where can I discover the relation of the frame numbers to the frame on a 120 film? Is there a British Standard Specification for this?*

(5) *I propose to use a F4.5, 10.5 c.m. lens. Will this be suitable?*

F.J.B. (Malvern).

(1) It would appear that any of the standard types of dark slides could be used with this camera, but the back will obviously have to be designed to suit the slides. It is possible that some particular type of slide was intended to be used, but the details given do not allow of any conclusions being reached about this.

(2) There would be no serious objection to making the back so that the slideway runs right through, and in some cases it may be an advantage, provided that some means of locating the slide in its central position, and also of trapping any possible leakage of light at the two ends, is provided.

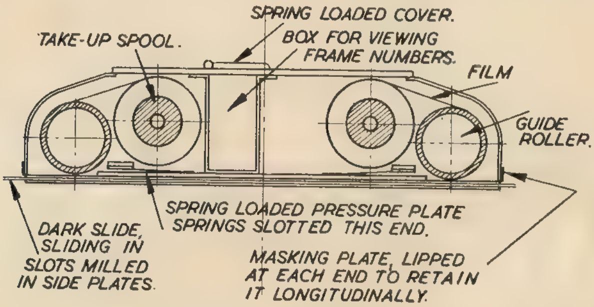
(3) (*a*) There is no objection to bending the film backwards, and this is the common arrangement in commercially-made roll film holders.

(*b*) We do not recommend a polished aluminium pressure plate. It would, in our opinion, be better to use stainless-steel or chromium-plated brass to produce the hardest possible surface, which would not be liable to pick up grit. Ribs in the direction of film travel do not appear to be of any advantage.

(*c*) The arrangement shown in your sketch for viewing the frame numbers on the film should be quite satisfactory, and it is not necessary to provide a flexible light-tight joint between the viewing box and the back of the pressure plate, provided that the usual red window is fitted, and that it is not exposed to light more than is necessary.

(4) We cannot refer you to any standard arrangements in relating the frame numbers to the actual location of the frames on films, and we believe that it varies considerably for different makes.

(5) The lens suggested should be quite suitable for use with plates or films up to $3\frac{1}{2}$ in. $\times$ $2\frac{1}{2}$ in.



Press camera film back

Knurling Troubles

Can you advise me, please about a trouble I encounter when knurling? I am using a single-wheel knurling tool, and while I am fairly successful (but not always) in obtaining a plain straight or diagonal knurl, I am in trouble when attempting a double diagonal knurl; that is, when using right- and-left-handed knurling wheels in succession. The second wheel usually wipes out the first set of knurling completely, or so cuts it up that the appearance is destroyed.

C.R. (Exmouth).

It would appear that you are applying far too much pressure to the second wheel. The surface left by the first wheel is not solid, as it is in the first instance, but consists of a series of ridges, which are fairly easily depressed. The second cut should not, therefore, be taken at the same lathe setting, but the pressure applied gradually until, by inspection, it is found that the cut is complete.

Knurling should be done step by step, with frequent pauses to allow the wheel to cut, but a fairly hard initial pressure should be applied, so that a firm knurl begins to form almost at once. If the initial pressure is too light, the surface tends to break up and become "fluffy."

Plentiful lubrication with soluble oil or lard oil should be given, and the teeth of the wheel cleaned occasionally with a stiff brush.

Castings for "Kinglet" 5 c.c. Engine

Where can I obtain castings and timing gears for E. T. Westbury's "Kinglet" 5-c.c. 4-stroke petrol engine?

W. J. L. (London, E.5)

Castings for the "Kinglet" 5-c.c. engine can be obtained from George Kennion & Co., 32, Kingsland Road, London, E.C.3. Timing gears for this engine can be obtained from Bond's o' Euston Road Ltd., 357, Euston Road, London, N.W.1.

WITH THE CLUBS

The Northern Association of M.E.

At the June meeting we welcomed two new members, the Deeside Model Engineering Society, and the Heywood Model Engineers' Society. The latter is a newly-formed society, and we wish them every success.

Future activities include a visit to Messrs. John Summers steelworks, at Shotton, on July 2nd, and the Association Locomotive Rally, which is to be held at the track of the Urmston Society, in Abbotsfield Park, Flixton, nr. Manchester, at 2.0 p.m., on Sunday, July 11th. This will be a social occasion, and all visitors will be very welcome.

Hon. Secretary: J. H. S. WILLIAMS, 154, Park Road, Timperley, Cheshire.

Atlantic Live Steamers Association (Canada)

On May 24th three locomotives were under steam on the 75 ft. track at the home of Mr. Winsby Walker, 5, Kensington Drive, Moncton, New Brunswick. They were a $2\frac{1}{2}''$ gauge "City of Ottawa 4-6-0 (Josslin design), a 4-4-0 L.M.S. express type, and a "Juliet." A coal-fired "O" gauge American type was complete, but the $2\frac{1}{2}''$ and $3\frac{1}{2}''$ gauge track could not accommodate it. Other incomplete jobs were on display.

The $2\frac{1}{2}''$-gauge locomotive successfully handled a load of the driver and nine boys, the L.M.S. job will easily handle a load of 1,200 lb. and "Juliet" pulls 550 lb. of passengers.

Residents of Canada, east of Montreal, and visitors on boats to Atlantic ports are invited to get in touch with either Mr. Fred Massey, Fair Vale, (suburb of Saint John) or Mr. R. Baird, 24, Rowe Avenue, Halifax.

The Junior Institution of Engineers

The Junior Institution of Engineers offers for annual competition the Durham Bursary of the value of £20 in cash. The award carries with it membership of the Institution for three years.

Candidates must be over 19 and under 25 years of age at the time of entry, but they need not already be members of the Institution. They must be young men born of British parents in the British Isles, New Zealand, Australia, Canada or South Africa. They must be in course of training for the engineering or an allied profession by employment in a technical office or works, or by attendance at a recognised university, college or institute.

Entrants compete by submitting a thesis written in English on some engineering, technical or scientific subject selected by the entrant, such thesis being written specially for the Bursary Award.

Further particulars may be obtained from: The Secretary, The Junior Institution of Engineers, 39, Victoria Street, Westminster, London, S.W.1.

Wicksteed Model Yacht & Power Boat Club

The Annual Regatta will take place at Wicksteed Park, Kettering, on July 4th at 11.30 a.m. Events will include the 500 yards race for the Timpson Trophy (30 c.c.), 1,000 yards race for the Newton Loake Trophy (30 c.c.); also, races for 15 and 10 c.c. boats and a Steering Competition for prototype boats.

Clubs or individual visitors wishing to book lunches or teas should apply to the Secretary: DOUGLAS WARD, 5, Noble Avenue, Irthlingborough.

Exmouth and District S.M.E.

Our annual exhibition will take place at the Y.M.C.A. Hall, Victoria Road, Exmouth from Wednesday, August 11th to Saturday, August 14th inclusive. Opening 7.30 p.m. on Wednesday by the President, H. Jarvis Graves, closing 9.0 p.m. Other days open from 10 a.m. to 9.0 p.m. All types of models. A 5-in. gauge railway in operation each evening and Saturday afternoon.

Hon. Secretary: R. D. N. SALISBURY, The Croft, Gussiford Lane, Exmouth. Tel. 4020.

Nottingham Model Race Car Club

On Sunday, July 4th, the N.M.R.C.C. will be holding their annual "Open Day" at the Bassingfield Track, Nottingham. This event will be run under the M.C.A. Grading System, racing will begin at 12 noon and continue until approx. 5-30 p.m.

Hon. Secretary: G. STOWERS, 97, Laurie Avenue, Forest Fields, Nottingham.

Mr. L. Aspinall starting away his well-detailed "Stirling Castle" on the Brighouse Society's lake. Photo by "Northerner"

THE MODEL ENGINEER DIARY

July 3rd.—Vickers-Armstrongs Ltd. (Weybridge) Model Club. Annual exhibition, at V.A.B. Ltd., Sports Ground, Kings Head Lane, Byfleet, Surrey.

July 4th.—Wicksteed M.Y. & P.B.C.—Regatta at Wicksteed Park, Kettering.

July 4th.—Bromley M.P.B.C.—Regatta for free-running, radio-controlled and "D" class boats at Whitehall Recreation Ground, Bromley, Kent.

July 10th and 11th.—International Radio Controlled Models Society. Annual Contests for radio controlled models, to be held in Birmingham.—Model Boats on July 10th, and Model Aircraft on July 11th,

July 11th.—Southend Model Power Boat Club.—Regatta at Southchurch Park, Southend-on-Sea.

August 8th-13th inclusive.—Hastings & District Model Engineers Society.—Exhibition in the Lower Hall, White Rock Pavilion, Hastings. Open from 10 a.m. to 9 p.m. daily except 8th, 3 p.m. to 9 p.m.

August 18th, 19th 20th, 21st.—Weymouth & District Model Engineering Society.—Model Railways and Engineering Exhibition, at the Melcombe Regis Boys School, Weymouth. Open from 11 a.m. to 9 p.m.

August 18th, 19th, 20th, 21st, 23rd. 24th, 25th, 26th, 27th and 28th. The Model Engineer Exhibition. at the New Horticultural Hall, Greycoat Street, Westminster, S.W.1. Open from 11 a.m. to 9 p.m.

CORRESPONDENCE

The Managing Editor invites correspondence and original contributions on all small power engineering and electrical subjects. Correspondence and manuscripts should not be addressed to individuals, but to the Managing Editor, THE MODEL ENGINEER, 19-20, Noel Street, London, W.1.

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WORKSHOP EQUIPMENT

Buck & Ryan for Lathes and Accessories, drilling machines, grinders, electric tools, surface plates, etc.—310-312, Euston Road, London N.W.1. Phone: Euston 4661.

"Impetus" machines, wood planers, motorised drills, belt sanders, electric motors, paint sprays, air compressors, circular saws, etc. Catalogue.—JOHN STEEL, Castlefields, Bingley.

Rebuilt Lathes. The Acorn Machine Tool Co. (1936) Ltd., offer rebuild to limits "Acorntools" and "Atlas" 10" swing s.s. available. Write—610-614, Chiswick High Road, W.4. (Phone: CHI 3416).

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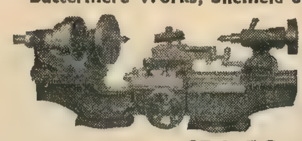

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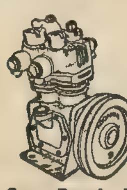

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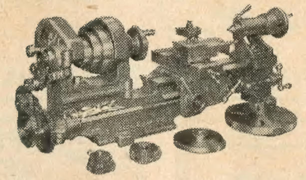

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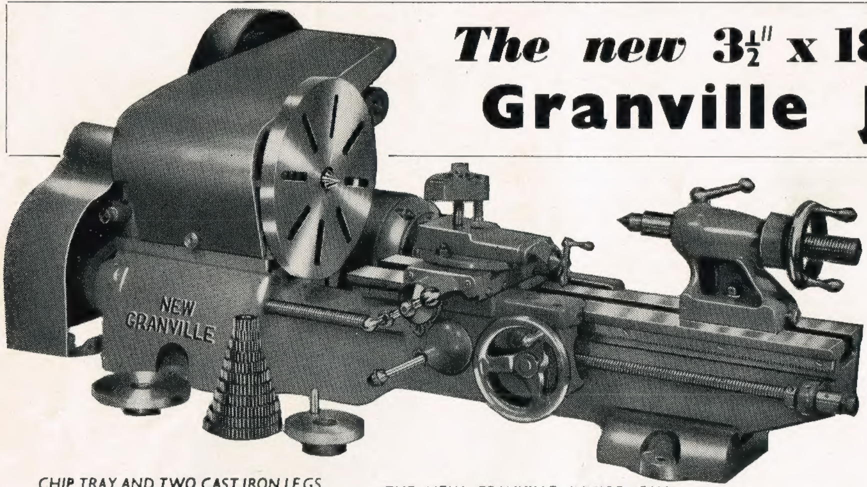

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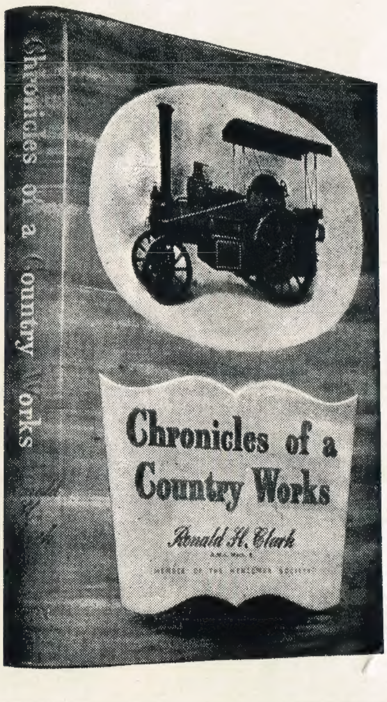

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